



REMEDIAL INVESTIGATION/FEASIBILITY STUDY WORK PLAN

OPERABLE UNIT 1

QUANTA RESOURCES SITE EDGEWATER, NEW JERSEY

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May 2005

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SECTION 1 INTRODUCTION

1.1 PROJECT BACKGROUND

This Remedial Investigation/Feasibility Study Work Plan (RI/FS WP) has been prepared in accordance with the requirements of the Administrative Order on Consent (AOC II-CERCLA-2003-2012 for the Upland Area, described as Operable Unit No. 1 (OU1) entered into by Honeywell International Inc. (Honeywell) and the Edgewater Site Administrative Group (ESAG), effective November 4, 2003. The RI/FS WP describes the RI/FS activities to be conducted at the Quanta Resources Corporation Superfund Site (Quanta Site) in Edgewater, New Jersey (Figure 1-1). This Work Plan and submittals are for OU1. A separate Work Plan, and RI and FS reports, will be submitted by Honeywell relative to their requirements under the OU2 AOC Agreement.

The Quanta Site is listed on the U.S. Environmental Protection Agency (USEPA)'s National Priorities List (NPL) and it has been assigned CERCLIS ID NJ000606442. The final listing on the NPL was made on September 5, 2002. The operable units divide the Site contamination in the Upland Area (OU1) and contamination in the Hudson River areas of the Site, including surface water and sediments, eastward of the Hudson River bulkhead (OU2). A site plan for OU1 is depicted in Figure 1-2. This RIWP includes the proposed scope of work, site plans, schedules, and methodologies for implementation of the remedial investigation tasks.

1.2 PROJECT OBJECTIVES

The objectives of the remedial investigation at the Quanta Site OU1 are to:

- Characterize potential soil and groundwater impacts.
- Define the nature and extent of contaminants. And, delineate those impacts caused by the release or threatened release of contaminants at or from the Upland Area of the Site, including ground water and soil.
- Evaluate the potential for human health and ecological impacts.
- Develop supplemental data, sufficient to address data gaps within the investigations conducted to date, to determine the need for and to allow a screening of appropriate remedial alternatives, recommendation of the most appropriate remedial alternative, and the development of a refined conceptual site model after a public comment process and the USEPA will be responsible for the selection of the final remedial alternative.

1.3 ORGANIZATION OF THIS WORK PLAN

This RIWP is organized into nine sections and three appendices. Section 1 is an introduction to the project. A general site background and description of the site is provided in Section 2. The site description and a summary of applicable previous investigation findings for OU1 are presented in Section 3. Section 4 describes the conceptual site model and work plan rationale. Remedial investigation and feasibility study activities for OU1 are described

Sections 5 and 6, respectively. Section 7 describes the project organization. Section 8 presents the schedule for implementing the RI tasks. References are included in Section 9. Appendix A contains the Field Sampling Plan. Appendix B contains the Quality Assurance Project Plan (QAPP). Appendix C contains the Health and Safety Plan (HSP).

1.4 ADDITIONAL INFORMATION

Two AOCs were issued for the Quanta Site, one for OU1 (defined in the AOC for OU1 as "the areas of the Site, including soil, debris and ground water, westward of the Hudson River bulkhead" and referred to herein after as the "Upland Area") and one for OU2 (defined in the AOC for OU1 as "the areas of the Site, including surface water and sediments, eastward of the Hudson River bulkhead" and referred to herein after as the "River Sediments and Water"). The respondents for this OU1 RI/FS are identified below.

Respondents for OU1 (Upland Area):

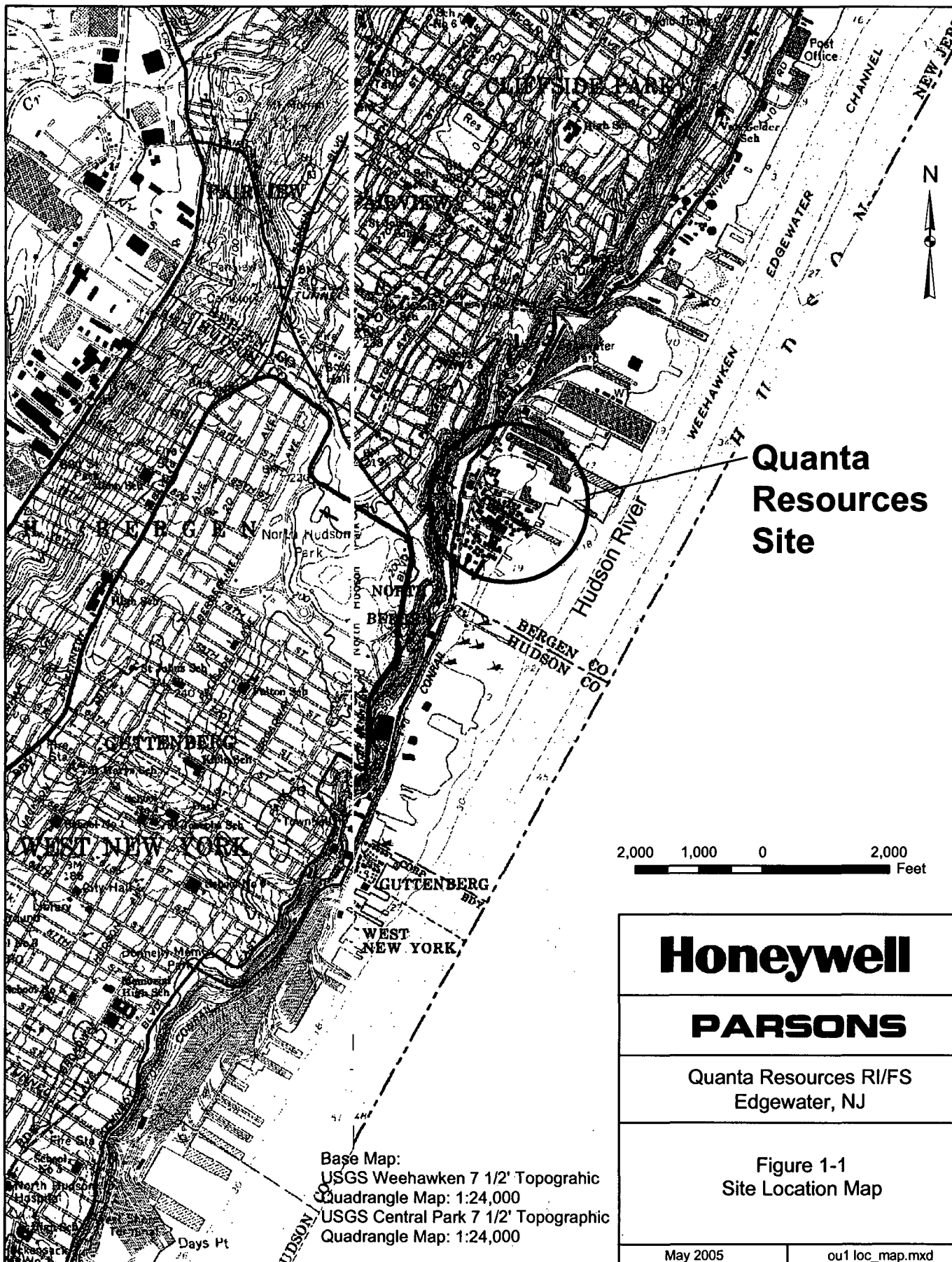
- Honeywell International Inc.**;
- Active Oil Services, Inc.;
- BASF Corporation;
- Beazer East, Inc.;
- BFI Waste Systems of New Jersey, Inc.;
- BorgWarner Inc. f/k/a Borg-Warner Automotive, Inc., and its corporate predecessors-in-interest, Borg-Warner Security Corporation and Borg-Warner Corporation;
- Buckeye Pipeline Company, LP;
- Chemical Leaman Tank Lines, Inc.
- Colonial Pipeline Company;
- Consolidated Rail Corporation;
- Daimler/Chrysler Corporation;
- Exxon Mobil Corporation
- Ford Motor Company;
- General Dynamics Land Systems, Inc.;
- Miller Brewing Company;
- Neapco, Inc.;
- Northrup Gruman Space and Mission Systems Corp. (f/k/a TRW Inc.);
- Petroleum Tank Cleaners, Inc.;
- Quanta Resources Corporation;
- Rome Strip Steel Company, Inc.;
- Avco Corp. (Textron, Inc.);
- The Stanley Works; and
- The United Technologies Corporation for is Pratt & Whitney Division and its subsidiaries Pratt & Whitney Canada, Ltd and Carrier Corporation

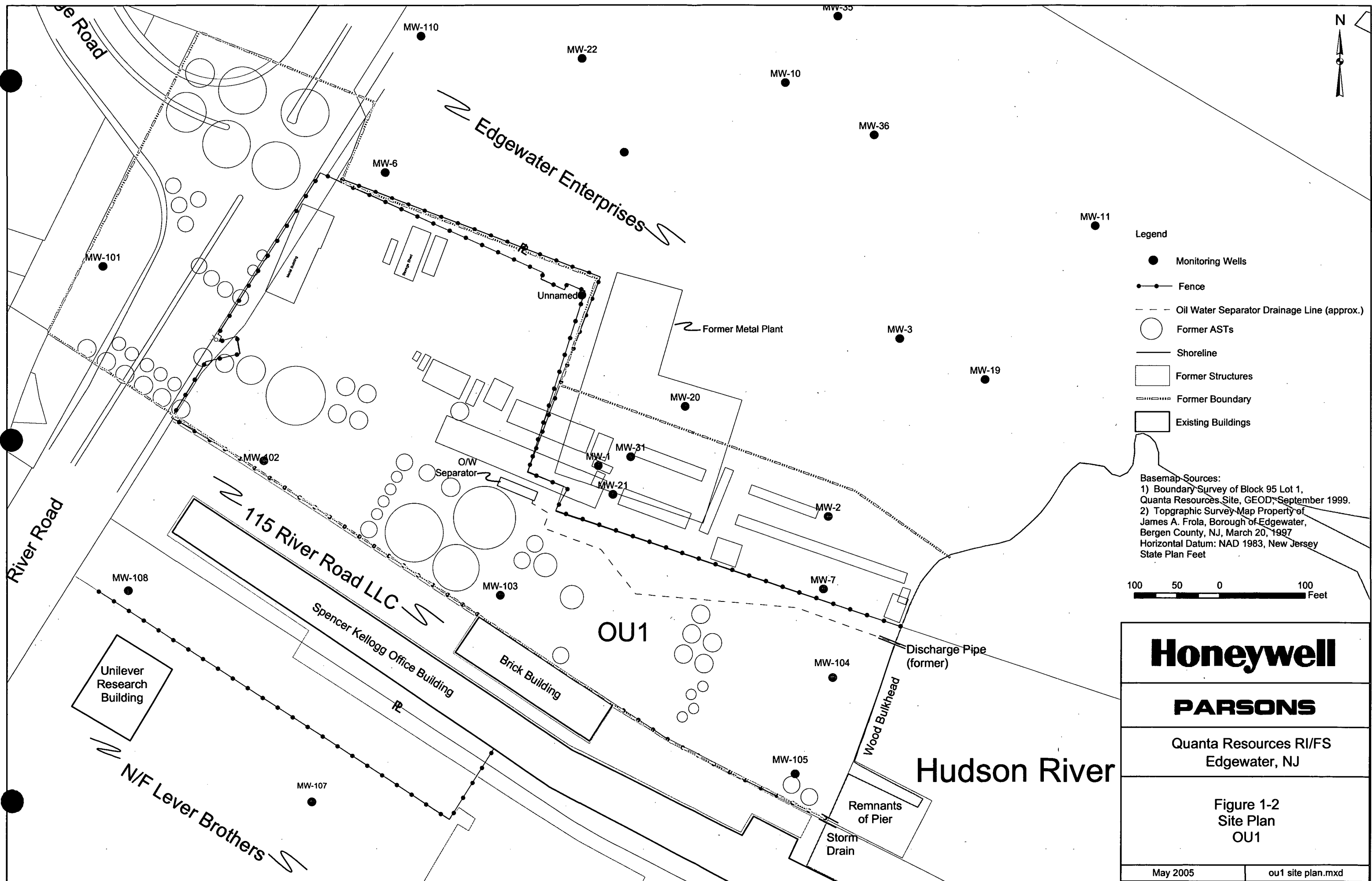
** Note: Allied Chemical became Allied Corporation in 1981, AlliedSignal in 1987, and was renamed Honeywell International Inc. in 1999.

FIGURES

Figure 1-1 Site Location Plan

Figure 1-2 Site Plan (OU1)





SECTION 2

SITE BACKGROUND AND DESCRIPTION - GENERAL

2.1 SITE LOCATION AND DESCRIPTION

The Quanta Resources, Inc. Edgewater NJ property is located in Bergen County at 163 River Road, Edgewater, New Jersey (Figure 1-1). The property is bordered to the north by the former Celotex and Lustrelon Industrial Park. The former Spencer Kellogg Industrial Park is located to the south. The Hudson River borders the property on the east and the (old) River Road borders the property to the west. The new River Road is located east of its former location and bisects a portion of the property.

Currently, the Quanta property is vacant (Figure 1-2). The property contains numerous exposed concrete tank and building foundations, the remains of an oil/water separator, a wood bulkhead at the river's edge and remains of wooden docks. New River Road cuts across the western side of the property. Remnant coal tar pitch is present on the ground surface at various areas. The former Celotex property is directly north of the Quanta property and is separated by a chain-link fence (a new access road is being constructed for the Celotex property). North of the former Celotex property is the former Lustrelon property. The former Celotex and Lustrelon properties are undergoing redevelopment, where several feet of additional fill has been imported and graded bringing these properties several feet above the grade of the property. Commercial and residential structures are being erected on the former Lustrelon property and northern portion of the former Celotex property. The southern portion of the former Celotex property remains at rough grade, and a new entrance is being constructed in this location near River Road. The Spencer Kellogg property, located immediately south of the property, has been redeveloped and presently includes the Interchange Bank, various offices, a newly reconstructed dock containing parking and offices, and a day-care center for the tenants. South of the Spencer Kellogg property is the Lever Brothers property, which is occupied by Unilever Research.

The Site will include the property at 163 River Road and other neighboring properties where contamination from the property may have migrated. No information has been discovered regarding the source of the original fill materials used to reclaim the marshlands at the site for development, as a result any further characterization will be based on sampling.

2.2 SITE HISTORY

Beginning in the early 1930s, Allied Chemical operated a tar processing plant on the Quanta property and the southern portion of the former Celotex property. Typically roofing plants of this type contain three main products: creosote, coal tar pitches, and refined tars used for roads. In 1974, Allied Chemical sold the property to the estate of Mr. James Frola and Mr. Albert Von Dohln. In 1977, Mr. Frola and Mr. Van Dohln leased the property to E.R.P. Corporation for the storage and recycling of oil. Shortly thereafter, E.R.P. Corporation assigned its lease to Edgewater Terminals, Inc. In July 1980, Quanta Resources Corporation obtained usage of the property through transfer of the lease from Edgewater Terminals. The property contained

61 aboveground storage tanks (ASTs) with a total capacity of over 9 million gallons, along with an unknown number (at least 10) of underground storage tanks (USTs), septic tanks, and numerous underground pipes (USEPA 1998). Over the full period of industrial use these tanks were used to store oil, tar, asphalt, sludge, process water and other unknown liquids. Oils and sludges were shipped to the property from refineries, chemical firms, and other industries for processing.

Over different periods of time the Celotex property contained a chemical plant, which produced acids, alums, and sodium compounds, and later a gypsum company and a vacuum truck company. The General Chemical Company that operated on the southern portion of the Celotex property produced sulfuric acid and not arsenic-based pesticides from at least 1900 to the late 1950s. This fact is based on an Insurance Map for General Chemical Division; Allied Chemical Corporation dated May 9, 1957. The map depicts a plan view of the facility and includes a table identifying the components (e.g., building, tanks, etc.) of the facility. The buildings, tanks and storage materials on this map indicate that General Chemical produced sulfuric acid on this property. The items are consistent with a process of sulfuric acid production using a "lead chamber process", which had been invented over 100 years prior to the use at the Site. The lead chamber process is used to produce much of the acid used to make fertilizers. In this process sulfur dioxide is oxidized and dissolved in water. The sulfur dioxide is obtained by burning sulfur, by burning pyrites (or iron sulfides), by roasting nonferrous sulfide ores preparatory to smelting, or by burning hydrogen sulfide gas. In the production process, sulfur dioxide is passed through a reactor tower and mixed with other gases. The mixture of gases (including sulfur dioxide) then passes through a lead-lined chamber (large boxlike room) where it is reacted with water. There may be several chambers in a series for the reactions to take place during which sulfuric acid condenses on the walls and collects on the floor of the chamber. After the gases have passed through the chambers, they are washed with cooled concentrated acid. The maps of the General Chemical Company indicate the main components of the above-noted process, including sulfur and pyrite storage areas, burner building, reaction chambers, sulfuric acid storage tanks are all present on the site and the layout of the components is believed to be consistent with sulfuric acid production.

After 1974 a metal reclaiming/refinishing plant was operated at the south side of the Celotex property. The former Lustrelon property, located north of the Celotex property housed a lacquer spray paint and parts cleaning operation and raw materials warehouse. A 1980 aerial photograph reviewed for a Removal Site Investigation (RSI) conducted by Honeywell shows dark staining of the ground at the location of the vacuum truck company on the Celotex property. A linear dark stained feature was also identified near the metals reclaiming/refinishing plant extending to the edge of the Hudson River, and also dark staining or colored discharge in the Hudson River was located near the end of this linear feature. In the RSI Report, it was speculated that these areas were unrelated to coal tar and waste oil recycling operations at the Quanta property and may have contributed similar chemical constituents to the environment. The RSI reported that between 1986 and 1989 an additional approximately eight feet of fill was placed on the Celotex property based on an analysis of aerial photographs from these dates.

On July 2, 1981, the New Jersey Department of Environmental Protection (NJDEP) forced the closing of the Quanta Resources facility operations when it was discovered that the storage

tanks contained large quantities of oil with polychlorinated biphenyl (PCB) concentrations as high as 260 parts per million (ppm). After 1981, the Quanta Property was not occupied.

Between 1984 and 1988, removal actions were conducted at the property. These actions were supervised by the USEPA and focused on the cleaning and decommissioning of the ASTs and USTs. The removal activities were completed in 1988 after several million gallons of product had been removed and disposed of or recycled. In addition, some underground piping and shallow soils containing coal tar were removed.

In 1992, USEPA conducted an assessment of the previous removal actions, which included the collection of soil, ground water, and sediment samples. Analytical results from these sampling activities indicated that CERCLA hazardous substances were present on the property.

From 1992 to present, the USEPA Removal Program has conducted several sampling events that included the collection of surface and subsurface soil samples, and surface water and sediment samples from the Hudson River in areas where sheen was observed adjacent to the Quanta property. Analytical data from these sampling events indicated the presence of elevated levels of polynuclear aromatic hydrocarbons (PAHs) and metals.

In 1997, hydrocarbon sheen became intermittently observable at the waterfront. The USEPA issued an Order requiring Honeywell to build a collection trench to stop oils from seeping into the Hudson River. Prior to submittal of the final design of the trench, it became apparent that the seeps may also be emanating from the adjoining properties. USEPA decided to stop the proposed construction and do an Engineering Evaluation/Cost Analysis (EE/CA) to identify the entire problem and develop an overall solution. In 1998, Honeywell entered into an Administrative Order on Consent to perform the EE/CA. Also, under the Order with USEPA (index number II-CERCLA-98-0112, dated 30 September 1998), Honeywell conducted a RSI at the Site. This investigation was conducted in 1998 and 1999 and included the collection of surface and subsurface soil samples collected from Quanta property as well as from properties in the vicinity of the Quanta property, ground water samples collected from monitoring wells, and sediment samples collected from the Hudson River. Based on the results of activities conducted during the RSI, heavy end coal tar product was estimated to extend from the uplands to approximately 750 feet into the Hudson River.

The EE/CA report was submitted in November 1999. It recommended constructing two parallel trenches to collect heavy and light oil fractions. The USEPA rejected the EE/CA in a letter dated February 16, 2000, as USEPA does not believe that the trench (as designed) would be effective in controlling the discharge and recommended that the FS consider other alternatives or technologies that are more effective. Included in that same letter was a request for Honeywell to do an "ecological evaluation" in the tidal mud flats of the Hudson River. In a meeting with USEPA, it was agreed that a trench system is an adequate first step, recommending installation of the trench and then performing the ecological assessment. However, over the last year, USEPA/Honeywell negotiated to conduct an RI/FS to compile additional data to address data gaps within the investigations conducted to date.

2.3 PREVIOUS INVESTIGATION SUMMARY

Previous investigations were performed on the Quanta property and the Site (as currently defined) by Parsons Engineering Science, Inc. (Parsons) in 1997 and by Roy F. Weston, Inc. (Weston) during 1992, 1995 and 1998, and finally GeoSyntec in 1999-2001. In 1999-2001, Geosyntec compiled the analytical results from soil and sediment samples collected during these investigations with the data collected during their RSI into an assessment of the nature and extent of contaminants. These data were incorporated into the GeoSyntec report. A limited amount of groundwater data from previous investigations were provided to GeoSyntec, but since most of the monitoring wells previously sampled were also sampled during the RSI, the previous groundwater data was not included in the RSI Report. Remedial investigations were also performed by EnviroSciences, Inc. (Enviro-Sciences) at the Celotex and former Lustrelon properties during 1997.

The RI scope of work for OUI is based on existing characterization data. The following documents contain characterization data:

- Roy F. Weston, Inc., 1992, Miscellaneous Site Investigation memorandums, sample location drawings, and analytical results, 1992, 1995-1998.
- Parsons Engineering Science, Inc., May 1997 – Pre-Design Investigation at the Quanta Resources Site.
- Parsons Engineering Science, Inc., March 1998 – Data Report For Pre-Design Investigation at the Quanta Resources Site.
- Parsons, May 1999, Summary Report, Quanta Resources Site.
- GeoSyntec, June 2000 – Removal Site Investigation Report - Revision 1, Quanta Resources Site.
- USEPA, August 2000, Final Report Ecological Risk Assessment, Quanta Resources Site, Edgewater, New Jersey, EPA Environmental Response Team.
- GeoSyntec, September 2001 – Engineering Evaluation / Cost Analysis (EE/CA) Report - Revision 2, Quanta Resources Site;
- TRC Raviv Associates, Inc., 2004, Ground Water Remedial Investigation Report Arsenic Area, Former Celotex Industrial Park, Edgewater, New Jersey..

A RSI was performed pursuant to a USEPA Administrative Order on Consent (AOC) index number II-CERCLA-98-0112, dated 30 September 1998. The purpose of the RSI Report was to: 1) identify possible conduits for the transport of coal tar product from source areas to the Hudson River; 2) delineate source areas that continue to impact soil, river sediment, and groundwater; 3) characterize the nature and extent of soil, river sediment, and ground water contamination; and 4) provide data on the geotechnical properties of the site soils in support of an evaluation of engineered site remedies.

Currently the Celotex and former Lustrelon properties are being managed under NJDEP jurisdiction. Some clean-up operations are still in progress at these properties, but these operations are being managed by other responsible entities, for those properties. The data

provided to GeoSyntec for the Celotex and former Lustrelon Properties is discussed in the RSI report but it may not represent the current conditions at these areas due to remediation actions directed at hot spot areas on these properties.

Subsequent to completion of the RSI, GeoSyntec prepared an EE/CA Report in September 2001. The EE/CA was prepared pursuant to USEPA Administrative Order on Consent. The EE/CA evaluated potential response actions to be taken to mitigate current and future releases from the Quanta property. In accordance with the SOW enforced by the AOC, the EE/CA evaluated alternatives that addressed the release of non-aqueous phase liquid (NAPL) to the Hudson River and the Upland Area contamination.

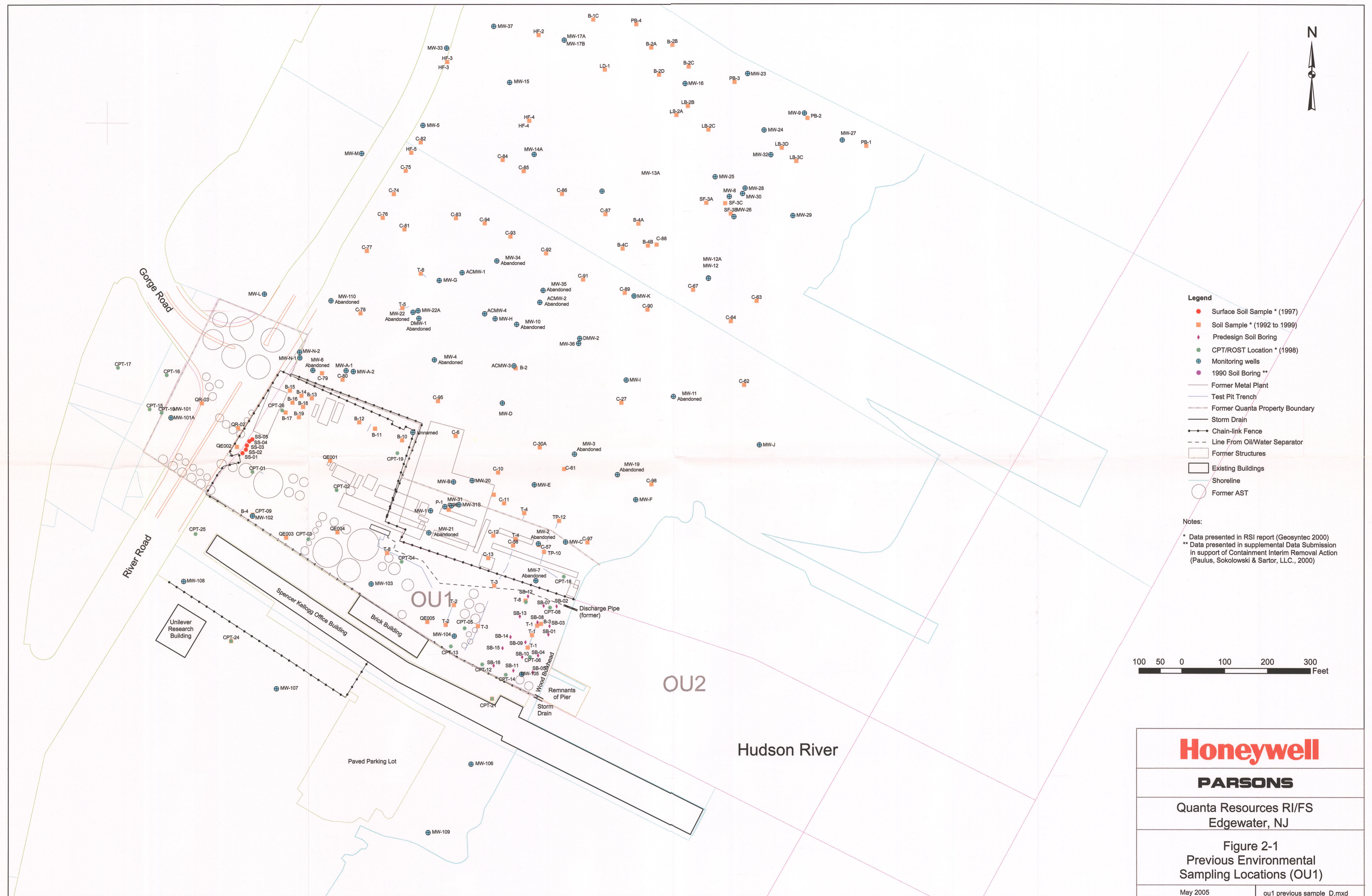
A discussion of the applicable findings of the previous investigations for OU1 is provided in Section 3 to provide framework for the proposed investigation presented in Sections 4, 5, and 6. The previous environmental sampling locations are shown on Figure 2-1.

2.4 GEOLOGIC SETTING

The Site is located within the Newark Basin of New Jersey (Drake et al., 1996). It is underlain by between approximately 35 to 55 feet of non-native fill and estuarine and salt-marsh deposits overlying bedrock. The fill at the Site consists of 9 to 18 feet of brown to black, fine to medium grained sand containing some silt, cinders, brick, wood, gypsum and concrete debris overlying layers of marsh clay, silt, or sand. The clay and silt layers together form a continuous confining unit (or aquitard). The clay is gray to black with traces of silt, roots, and shell fragments [Parsons, 1998; Enviro-Sciences, 1997; and GeoSyntec, 2000]. The silt is gray, brown to reddish brown, and often clayey. The sand is brown to gray, medium grained and sometimes silty. The bedrock at the Site is the Upper Triassic-age Stockton Formation, which consists of sandstone conglomerate and siltstone (Drake et al., 1996). Immediately west of the Site is the Palisades escarpment, which consists of intrusive bodies such as diabase sills and dikes, and is locally covered by the Rahway Till (Stanford, 1996). The ground elevation increases from approximately 10 to 18 feet, above mean sea level (msl) at the site to over 200 feet on the Palisades. Immediately to the east of the site lies the tidally influenced Hudson River. A bulkhead separates the Upland Area (OU1) from the Hudson River portion of the Site (OU2). River sediments consist of silt to clayey silt approximately 45 feet thick immediately east of the bulkhead, these sediments thicken eastward toward the main Hudson River channel; the bedrock is approximately 250 feet below the river sediments in the main channel (Stanford, 1996). Mud flats are exposed near the bulkhead at low tide and flooded during high tide. During previous industrial activities, the river sediments adjacent to the bulkhead were dredged to allow barge access to the Site. Sediments have re-deposited in this area since maintenance dredging ceased, bringing the mud flats to their current elevation.

FIGURES

Figure 2-1. Previous Environmental Sampling Locations (OU1)



SECTION 3

SITE DESCRIPTION – OU1 (UPLAND AREA)

3.1 HYDROSTRATIGRAPHIC UNITS AND GROUND WATER FLOW

Ground water on the Site occurs within the pore space of the unconsolidated fill and soils, and in the bedrock. Four hydrostratigraphic units (zones) have been identified, and from the ground surface down they are as follows: 1) fill and underlying sand and silty sand, 2) clay/silt, 3) sand (localized), and 4) bedrock. The upper zone consist of approximately 10 feet of fill and 15 feet of sand and silty sand and is presumed to be the most transmissive ground water flow zone on the Site. The fill and sand are present beneath the Upland Area; however, they are absent beneath the river portion of the Site. The upper zone is underlain by a lower permeability clay/silt aquitard, which has a measured hydraulic conductivity of 3.9×10^{-8} cm/sec (at 15-17 feet at MW-108). The clay/silt aquitard unit is approximately 20 feet thick beneath the upland portion of the site, but it thickens to 30 to 50 feet beneath the river. A localized 5-foot-thick sand zone occurs beneath the clay/silt aquitard in the Upland Area, however, this zone was not identified beneath the river. The bedrock is located 35 to 55 feet beneath the ground surface in the Upland Area and greater than 50 feet beneath top of the sediment in the river portion of the Site.

The water table varies from approximately 3 to 7 feet below ground surface (bgs) at the property. Groundwater flow is generally from west to east toward the Hudson River, although existing ground water contour maps (November 1998, June 1999, and June 2000) showed some variation in the direction of flow (specific gravity measurements of the oil are needed so that ground water elevations can be corrected for the presence of product in the wells). The development of former Celotex property (filling 8-10 feet above Quanta property), which is ongoing, may have altered the direction of local ground water flow. Ground water recharge occurs mainly from infiltration at the Site and in upgradient areas. Recharge is expected to be especially significant at the base of the Palisades escarpment approximately 400 feet to the west where the amount of infiltration from run off is expected to be relatively high. Vertical hydraulic gradients between the upper and low ground water zones have not been evaluated.

The Hudson River is tidally influenced near the Site with a 3- to 6-foot range of maximum water table fluctuation during a tidal cycle. The tidal fluctuations in the river cause a pressure front that "moves" through the aquifer and affects the shallow water table beneath the portion of the site nearest to the Hudson River. The zone of tidal influence appears to be relatively narrow [0.5 foot effect in MW-7, which is 75 lateral feet from the river, and little to no measurable effect in two wells (MW-20 and MW-31) located 300 and 370 feet from the river, based on information contained the RSI (GeoSyntec, 2000)].

The monitoring well construction and location information was obtained for wells on the Quanta property, the former Celotex property, former Spencer Kellogg property, and the Unilever property from previous reports (Table 3-1). This information was supplemented by a NJDEP 5-mile computer radius and 1-mile manual well search request that was sent to the NJDEP Bureau of Water Allocation on November 11, 2004. The results of the well search were received on December 15, 2004.

3.2 GROUND WATER CHEMISTRY

A review of existing ground water chemistry data collected in November 1998 and July 1999 indicates that plumes of dissolved volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs) including polynuclear aromatic hydrocarbons (PAHs), and selected inorganic compounds exist at the Site. However, the number of constituents present at concentrations above applicable or relevant and appropriate requirements (ARARs) is generally limited (Table 3-2). To help summarize the ground water chemistry at the Site, representative plumes were plotted for VOCs (benzene), SVOCs (naphthalene, 2,4-dimethylphenol, and styrene) including PAHs (benzo(a)pyrene), and inorganics (arsenic). These plumes are generally representative of the range of horizontal distributions for the dissolved constituents in the fill and sand / silty sand (upper ground water zone) on the site. They are representative of the range of horizontal distributions for the dissolved phase constituents. The other plumes are not significantly different in that the physical configuration is similar to the plumes noted above. In addition, these plumes form the basis for the proposed monitoring wells and other investigation points discussed in Section 3.

A comparison of existing ground water concentrations to ground water ARARs is presented on the Table 3-2. Given that the existing ground water data is up to five years old, new ground water sampling will be performed as part of this RI.

3.2.1 VOCs

A plume of dissolved VOCs (i.e., benzene, toluene, ethylbenzene, and xylenes; BTEX) in the upper ground water zone exists beneath the Quanta, Spencer Kellogg, Lever Brothers, and southern portion of Celotex properties (benzene is the representative plume (Contaminants), Figure 3-1). Any potential extension of this plume farther south onto Lever Brothers property has not been delineated. In addition, there may be two separate sources in the western portion of the site based on preliminary plume maps of these VOCs (Figure 3-1). One source may exist near MW-102 (and possibly MW-103) on the Quanta property and a less concentrated source to the north on the southwestern portion of the former Celotex property (near MW-6).

3.2.2 SVOCs

A plume of dissolved SVOCs (i.e., phenol, 2,4-dimethylphenol, 4-methylphenol, 2-methylphenol, styrene) is located primarily beneath the Quanta and Spencer Kellogg properties (naphthalene, 2,4-dimethylphenol, and styrene are the representative plumes, Figures 3-2 through 3-4). Among these, phenol, 2-methylphenol, and styrene form narrow plumes that appear to be sourced near MW-102. These plumes appear to be fairly well defined horizontally. The plumes for 2,4-dimethylphenol and 4-methylphenol extend farther south on the Lever Brothers property (i.e., MW-107) and their horizontal extent is not defined.

PAHs (naphthalene, acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, pyrene, phenanthrene, fluorene, fluoranthene) are a subset of SVOCs and the general distribution of PAHs in ground water is generally represented by the plume map for naphthalene. A plume of dissolved PAHs is located primarily on the Quanta and Spencer Kellogg properties, although the plumes for some of the individual

compounds extend to the north on the former Celotex property, and to the south on the Lever Brothers property [benzo(a)pyrene is the representative plume, Figure 3-5].

The acenaphthene plume is the most extensive. It appears to be sourced near well MW-102 (and possibly MW-103) on the Quanta property. There may actually be two plumes, one larger one to the south, and a smaller one just north of the Quanta property; however, there are no intermediate monitoring wells to verify this (the area near MW-106 on the Celotex property is the second possible source area). The larger plume extends farther south on the Lever Brother property (i.e., beyond MW-107). The plume appears to extend to the Hudson River. Other PAHs, including acenaphthene, anthracene, pyrene, phenanthrene, and fluorene also show a similar distribution, although these plumes are not as large.

The plumes of acenaphthylene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and chrysene are relatively narrow and emanate from an area near monitoring well MW-102 and extend east toward well MW-106.

3.2.3 PCBs

No PCBs were detected in ground water samples collected from four wells on and near Quanta Site (at MW102 and MW-106 on and near the western portion of the Quanta property and MW-9 and MW-18 located in the northern portion of the former Celotex property). However, due to the reported presence of PCBs in the oil storage tanks on the site, additional testing for PCBs in ground water at the Quanta Site is needed.

3.2.4 Ground Water Flow and Dissolved Organics Plumes

The VOC, SVOC, and PAH dissolved ground water plumes are generally consistent with migration that would be predicted by the direction of flow indicated from existing ground water contour maps for the Site. However, on one of the maps (November 1998) there is an abrupt shift in contours beneath the Spencer Kellogg building, which is not consistent with the configuration of the ground water plumes mapped on Site (e.g., the plumes trend southeast while the contours beneath the Spencer Kellogg Building in the November 1998 map indicate that they should move east and northeast). Additional ground water contour maps using all available wells, and based on seasonal depth to ground water measurements, will be constructed during the RI to resolve this discrepancy. It also noteworthy that there are only four wells installed on the Quanta property and additional wells are needed for delineation of the dissolved plumes.

3.2.5 Chlorinated Organics

Dissolved chlorinated organics occur on the northern portion of the former Celotex and Lustrelon properties. Chlorinated organics are not constituents of concern for the Quanta Site. None were detected in wells on the Quanta property or on immediately surrounding properties.

3.2.6 Oxidation Reduction Potential (ORP) Chemistry

Because hydrocarbons have long since entered the ground water system at the Site, there has likely been rapid depletion of oxygen (no oxygen data are available) caused by rapid increase in levels of microbial respiration, which resulted in the establishment of anaerobic conditions within the dissolved contaminant plumes. The ORP ground water chemistry data indicate that

reducing (anaerobic) conditions exists in the fill and sand/silty sand beneath the Quanta property and the southern portion of the former Celotex property (ORP values -8 eV to -298 eV) (Figure 3-6). These anaerobic conditions are generally coincident with the horizontal distribution of the BTEX (and other hydrocarbon) plumes. ORP values outside of this area are indicative of near-aerobic conditions in the aquifer. The existing ground water data also indicates that there has been no significant contamination in the lower ground water zone, however, further investigation will be done to confirm this.

The ORP values less than 0 eV (which is representative of the range of values measured on and near the Quanta property) indicate that iron, sulfate, and CO₂ are the most likely electron acceptors involved in the processes that drive natural biodegradation of the hydrocarbons on the site (Wiedemeier et al. 1995). Oxygen may be used as the electron acceptor on the margins of the plumes where dispersion helps spread the plume out to more oxygenated regions of the ground water.

It is not possible to determine which biodegradation processes dominate at the Site given the available data. Additional natural attenuation data (e.g., dissolved oxygen, nitrate, iron, sulfate, methane, and alkalinity) are necessary to fully evaluate the potential natural biodegradation of hydrocarbons. These data are necessary to determine if natural biodegradation of selected hydrocarbons is an important process to be considered as a component in the final remedy for the Site.

3.2.7 Inorganics

Inorganics were mapped in ground water on the Quanta Site (arsenic is the contaminant and representative plume, Figure 3-7.). Arsenic was detected in 20 of 30 ground water samples. The highest concentrations of arsenic were found in wells MW-107, MW103, MW-21, MW-1, MW-31 (a confined aquifer well), and MW-20 - all are located in the southern portion of the site on the Celotex, Quanta, and former Lustrelon properties, and MW-6, which is located in the western portion of the Celotex property. A former metal plating facility located in the southern portion of the Celotex property may be the source for elevated arsenic concentrations in this area of the Site. Arsenic concentrations decrease consistently in the downgradient direction toward the Hudson River. It should be noted that no metals data was collected from two onsite wells (MW-104 and MW-105) and further investigation is needed.

Chromium was detected in 8 of 30 ground water samples (Table 3-2). The extent of chromium was limited to the southern portion of the site in wells located on the Celotex, Quanta, and the former Lustrelon properties. The highest concentrations of chromium were detected in wells MW-31 (a confined aquifer well), MW-20, and MW-106.

Lead was detected in 5 of 30 ground water samples (Table 3-2). The extent of lead in ground water was limited to the southern portion of the Site. Lead was not detected in downgradient samples along the edge of the river, with the exception of MW-109.

3.2.8 Ground Water Classification

Ground water at and in the vicinity of the site is not currently used as a source of potable water due to a readily available public water supply, and the potential for intrusion of saline

reducing (anaerobic) conditions exists in the fill and sand/silty sand beneath the Quanta property and the southern portion of the former Celotex property (ORP values -8 eV to -298 eV) (Figure 3-6). These anaerobic conditions are generally coincident with the horizontal distribution of the BTEX (and other hydrocarbon) plumes. ORP values outside of this area are indicative of near-aerobic conditions in the aquifer. The existing ground water data also indicates that there has been no significant contamination in the lower ground water zone, however, further investigation will be done to confirm this.

The ORP values less than 0 eV (which is representative of the range of values measured on and near the Quanta property) indicate that iron, sulfate, and CO₂ are the most likely electron acceptors involved in the processes that drive natural biodegradation of the hydrocarbons on the site (Wiedemeier et al. 1995). Oxygen may be used as the electron acceptor on the margins of the plumes where dispersion helps spread the plume out to more oxygenated regions of the ground water.

It is not possible to determine which biodegradation processes dominate at the Site given the available data. Additional natural attenuation data (e.g., dissolved oxygen, nitrate, iron, sulfate, methane, and alkalinity) are necessary to fully evaluate the potential natural biodegradation of hydrocarbons. These data are necessary to determine if natural biodegradation of selected hydrocarbons is an important process to be considered as a component in the final remedy for the Site.

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Inorganics were mapped in ground water on the Quanta Site (arsenic is the contaminant and representative plume, Figure 3-7.). Arsenic was detected in 20 of 30 ground water samples. The highest concentrations of arsenic were found in wells MW-107, MW103, MW-21, MW-1, MW-31 (a confined aquifer well), and MW-20 - all are located in the southern portion of the site on the Celotex, Quanta, and former Lustrelon properties, and MW-6, which is located in the western portion of the Celotex property. A former metal plating facility located in the southern portion of the Celotex property may be the source for elevated arsenic concentrations in this area of the Site. Arsenic concentrations decrease consistently in the downgradient direction toward the Hudson River. It should be noted that no metals data was collected from two onsite wells (MW-104 and MW-105) and further investigation is needed.

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Lead was detected in 5 of 30 ground water samples (Table 3-2). The extent of lead in ground water was limited to the southern portion of the Site. Lead was not detected in downgradient samples along the edge of the river, with the exception of MW-109.

3.2.8 Ground Water Classification

Ground water at and in the vicinity of the site is not currently used as a source of potable water due to a readily available public water supply, and the potential for intrusion of saline

water from the Hudson River. However, the ground water at the site is a Class II-A aquifer according to NJDEP. This classification will be used to evaluate potential future receptors in the baseline human health risk assessment.

3.3 SURFACE AND SUBSURFACE SOIL CHEMISTRY

The discussion below primarily relates to samples collected in the vicinity of the Quanta property (southern half of former Celotex, all of Spencer Kellogg, and the northern portion of the Lever Brothers). The discussion is presented for the major soil units on the Site (Fill, Sand and Silty Sand, Clayey Silt/Silty Clay, and Lower Sand). The number of soil samples collected from each of the stratigraphic units on the Quanta Site is provided in Table 3-3. This table also indicates the analytical parameters that were evaluated in the soil units as well as the number of detections for each of the parameters. In addition, in order to meet the programmatic requirements of both USEPA Region 2 and NJDEP, a list of commonly detected compounds on the Site and information about these compounds is displayed along with the USEPA Region 9 Preliminary Remediation Goal (PRG)s and the NJDEP Soil Cleanup Criteria (SCC) on Table 3-4. A summary of the soil chemistry data is presented in Figure 3-8. This figure shows comparisons to the NJDEP SCC, however, in the RI report the existing and new soil sample results will be compared to the lower of the Region 9 PRGs and NJDEP SCC to aid in the characterization of the Site contamination.

3.3.1 Fill

In the area of the Site (Quanta property and immediate vicinity on surrounding properties), a total of 109 samples were analyzed for VOCs, PAHs, PCBs, pesticides, and metals in the fill. Based on the information presented in Table 3-3, the fill unit is the most characterized unit in terms of the number of analyses compared to the other units on the Site.

The primary VOCs detected in the fill were the BTEX compounds. The maximum concentrations detected for these compounds were found in the fill (TP-14) (Table 3-4).

PAHs were detected in nearly every sample collected at the Site and the maximum concentrations for all 16 PAH compounds were found in the fill at T-1, T-8, and MW-105 (Table 3-4).

The metals arsenic, chromium, and lead were detected in the majority of the samples analyzed in the fill. The maximum concentrations for arsenic and lead were found in the fill at locations C-79 and T-6 (Table 3-4).

In addition, five surface soil samples (SS-1 through SS-5) were collected by Parsons (May 1997) in the vicinity of a "hot spot" previously identified in sample QE-002 near River Road to delineate the extent of PCBs in surface soils (Figure 2-1). Sample QE-002 contained 74 mg/kg of PCB Aroclor 1242 based on USEPA sampling results from 1994. PCBs were detected at low concentrations in all five surface soil samples. PCB concentrations ranged from 0.38 mg/kg in SS-1 to 3.65 mg/kg in SS-4. Aroclor 1242 comprised the majority of the PCBs detected. Lesser amounts of Aroclor 1260 were detected in four of the five samples at concentrations ranging from 0.2 to 0.55 mg/kg and Aroclor 1254 in one sample at a concentration of 0.38 mg/kg.

The five soil samples near the PCB "hot spot" were also analyzed for TPH. TPH in the diesel fuel range was detected in all five samples. The concentrations ranged from 160 mg/kg in SS-1 to 8,600 mg/kg in SS-5.

3.3.2 Sand and Silty Sand

In the sand and silty sand unit, samples were collected from 12 locations (including MW-101, MW-102, MW-103, and MW-107). PAHs, arsenic, chromium, and lead were detected in all 12 samples collected from this unit. VOCs associated with petroleum hydrocarbons (e.g., benzene and toluene) were detected in less than half of the five samples analyzed (Table 3-3).

3.3.3 Clayey Silt/Silty Clay

Sixteen locations (T-3, MW-103, B-3, B-4, T-4, MW-105, MW-106, TP-10, MW-109, and MW-107) were sampled in the clayey silt/silty clay unit at the Site. Eight VOC samples were collected in the clayey silt/silty clay unit.

Fifteen PAH compounds were detected in the sixteen soil samples collected on the Site (Table 3-4). The locations with the greatest PAH concentrations in the clayey silt/silty clay are located in the eastern portion of the Site.

Arsenic, chromium, and lead were detected in nearly all of the samples from the clayey silt/silty clay unit. The highest concentration for chromium (676 mg/kg) was found in this stratigraphic unit (at MW-106).

A clay unit, approximately 12 feet thick, was observed on the western portion of the Spencer Kellogg property in the vicinity of MW-108. Only one sample (MW-108) was collected from this unit. No BETX compounds were detected above the detection limits. Arsenic was not detected above the reporting limit of 3.2 mg/kg. Chromium was detected at a concentration of 24.8 mg/kg. Lead was detected at a concentration of 11.4 mg/kg.

3.3.4 Lower Sand

No soil samples from the lower sand unit have been evaluated using laboratory analytical methods.

3.4 NAPL DELINEATION IN SOIL

As part of a pre-design investigation by Parsons (March 1998), a series of 10 soil borings (SB07 through SB16) were drilled along two parallel lines approximately 75 feet and 110 feet west of the timber headwall that comprises the bulkhead (Figure 2-1). The borings were advanced to the top of the clay and silt layer, which ranged from 10 to 12 feet below the land surface. An oily sheen and tar product was observed in each boring. The distribution of the tar product along the bulkhead will be determined during the RI.

NAPL was delineated in the GeoSyntec (2000) report based on visual observation and chemical testing of samples from soil borings, test trenches, sediment cores, Vibracores, and Rapid Optical Screening Tool (ROST) data. The resulting map shows an interpreted plan view

of the "projected extent of heavy-end product" (Figure 5-1, GeoSyntec 2000). This delineation lumps all NAPLs together into one continuous layer, however this "simplistic" distribution is not likely to represent the true distribution. The NAPL is reportedly of different types [Light(L)NAPL vs. Dense(D)NAPL] but there is no distinction made based on a review of existing reports - the LNAPLs and DNAPLs are not distinguished from each other. Nor are different types of LNAPL delineated. Based on historical use, the report assumes that the heavy-end product is made up of coal tar, creosote, and other hydrocarbons - the coal tar occurs in several forms, including hard solid pitch, sticky roofing pitch, and viscous oil-like tar. In the Uplands Area, oil-like product was collected from four wells on the Quanta property (MW-102, MW-103, MW-104, and MW-105).

The RI will collect data to fill in data gaps related to the accurate mapping of the NAPL. It will be important to make a distinction between areas of free (or mobile) NAPL and residual NAPL (or NAPL that has reached residual saturation) because this will help determine the most applicable remedial alternatives to address NAPL on the Site. Activities will quantify the migratory potential and recoverability of any product found in the LNAPL/DNAPL observation wells.

In addition, NAPL seeps have been observed to occur beneath the wood pile-supported concrete platform and on the tidal mud flat in close proximity to the platform. The most persistent NAPL seep is located at the northern end of the concrete platform in a location where a former oil / water separator line in the upland area discharged to the surface water and tidal mudflat.

3.5 REMNANT UNDERGROUND UTILITIES

Geophysical surveys were conducted during the RSI using electromagnetic instruments (EM-31 and EM-61) to locate underground piping related to the transport of coal tar to the Hudson River during previous operations. The buried pipelines have the potential to be acting as preferential pathways for migration. The EM-31 survey grid extended over central and eastern portions of the Quanta property and the southeastern portion of the Celotex property. The subsequent EM-61 survey investigated a majority of the established grid. The geophysical results indicated that there were numerous anomalies indicative of buried metal objects, and those with linear trends were interpreted as buried pipe lines. The results of the geophysical survey were depicted on a grid in the RSI report, however this grid was not tied to site features. The presentation of the existing EM-31 and EM-61 geophysical data will be improved in the RI report.

Trenches were excavated at selected areas within the geophysical survey and where there was evidence of buried pipelines. Numerous small diameter pipelines were located around the Quanta and southern Celotex properties, most of which were only a few feet in length. An approximately 18-inch pipe, which appears to drain from the former oil/water separator, was traced for 190 feet toward the Hudson River, terminating approximately 325 feet west of the bulkhead. Additional test pits conducted along the suspected pipeline toward the river did not locate the 18-inch pipe. The alignment of the oil / water separator drain pipe (Figure 1-2) was first depicted in a previous site investigation memorandum (Weston, 1995). In addition, a portion of a 36-inch metal discharge pipe was shown to exist along a similar alignment along the

waterfront (near the bulkhead) in the northeastern corner of the Quanta property on a preliminary design plan prepared for a NAPL recovery system (Parsons, 1997). It is possible that a significant section of this pipe may have been removed during previous removal actions at the Site.

TABLES

Table 3-1	Well Construction
Table 3-2	Summary of Groundwater Chemistry Data from Monitoring Wells in OU1
Table 3-3	Soil Sample Distribution in OU1
Table 3-4	Summary of Soil Chemistry Data From OU1

Table 3-1
Well Construction
Quanta Resources Site
Edgewater, New Jersey

Location	Northing	Easting	TOC Elevation	Property	Unconf'd or Conf'd	Top of Screen	Bottom of Screen	Total Depth (ft. bgs)	Well Construction
MW-1	718766.29	633320.07	13.37	CELOTEX	U	3.67	18.67	18.67	4" - PVC
MW-2	718706.54	633592.85	13.6	CELOTEX	U	--	--	--	--
MW-3	718915.93	633676.85	10.58	CELOTEX	U	5	20	20	4" - PVC
MW-4	719135.23	633350.68	12.92	CELOTEX	U	6.25	16.25	16.25	4" - PVC
MW-5	719680.15	633324.3	17.27	CELOTEX	U	10.17	25.17	25.17	4" - PVC
MW-6	719111.49	633066.52	10.21	CELOTEX	U	3	18	18	4" - PVC
MW-7	718621.34	633586.99	9.89	CELOTEX	U	2.67	17.67	17.67	4" - PVC
MW-8	719513.48	634037.58	--	CELOTEX	U	7.25	22.25	22.25	4" - PVC
MW-9	719707.21	634212.88	14.26	LUSTRELON	U	5.17	20.17	20.17	4" - PVC
MW-10	719217.63	633542.45	9.8	CELOTEX	U	2	17	17	4" - PVC
MW-11	719048.94	633906.74	13.39	CELOTEX	U	7.5	22.5	22.5	4" - PVC
MW-12	719358.91	633968.04	14.25	CELOTEX	U	8	23	23	4" - PVC
MW-12A	719358.91	633968.04	--	CELOTEX	U	9.5	19.5	20	4" - PVC
MW-13	--	--	--	CELOTEX	U	10	20	20	4" - PVC
MW-13A	719527.2353	633741.2408	--	CELOTEX	U	7	17	17	4" - PVC
MW-14	--	--	--	CELOTEX	U	12	22	22	4" - PVC
MW-14A	719623.11	633552.18	16.97	CELOTEX	U	7	17	17	4" - PVC
MW-15	719779.94	633526.32	15.08	CELOTEX	U	9.5	19.5	19.5	4" - PVC
MW-16	719775.97	633934.63	16.05	CELOTEX	U	9	19	19	4" - PVC
MW-17	--	--	--	CELOTEX	U	10.5	20.5	20.5	4" - PVC
MW-17A	719877.94	633653.62	14.21	LUSTRELON	U	6	16	16	4" - PVC
MW-17B	719877.94	633653.62	14.21	CELOTEX	U	--	--	--	--
MW-18	720014.92	633474.07	11.17	LUSTRELON	U	4	14	14	4" - PVC
MW-19	718867.57	633777.07	9.56	CELOTEX	U	5	15	15	4" - PVC
MW-20	718835.82	633423.6	14.08	CELOTEX	U	5	15	15	4" - PVC
MW-21	718732.33	633337.53	12.95	CELOTEX	U	3	18	18	4" - PVC
MW-22	719246.04	633300.81	10.85	CELOTEX	U	3	18	18	4" - PVC
MW-22A	719250.4255	633321.3834	14.73	CELOTEX	U	7	17	17	--
MW-23	719799.38	634080.53	13.35	LUSTRELON	U	8	18	18	4" - PVC
MW-24	719667.86	634118.71	16.77	CELOTEX	U	8	18	18	4" - PVC
MW-25	719559.35	634004.52	14.22	CELOTEX	U	--	--	--	--
MW-26	719466.85	634048.47	18.44	CELOTEX	U	6.5	21.5	21.5	4" - PVC
MW-27	719644.58	634301.02	15.17	CELOTEX	U	10	20	20	4" - PVC
MW-28	719532.97	634074.48	13.52	CELOTEX	U	7.5	17.5	17.5	4" - PVC
MW-29	719469.13	634185.93	13.51	LUSTRELON	U	7	17	17	4" - PVC
MW-30	719520.26	634068.52	14.21	LUSTRELON	C	30	40	40	2" - PVC
MW-31	718776.7	633358.44	13.65	CELOTEX	C	30	40	40	2" - PVC
MW-31S	718807	633416	16.73	CELOTEX	U	8	18	18	--
MW-32	719610.43	634134.49	14.92	CELOTEX	U	--	--	--	--
MW-33	719859.71	633379.71	13.19	CELOTEX	U	7.5	17.5	17.5	4" - PVC
MW-34	719365.19	633496.25	15.97	CELOTEX	U	7.5	17.5	17.5	4" - PVC
MW-35	719296.48	633604.1	15.63	CELOTEX	U	7.5	17.5	17.5	4" - PVC
MW-36	719156.16	633646.68	15.42	CELOTEX	U	6.5	16.5	16.5	4" - PVC
MW-37	719910	633489.39	14.31	CELOTEX	U	7	17	17	4" - PVC
MW-101	719001.17	632734.82	8.12	QUANTA RESOURCES	U	4	19	19	2" - PVC
MW-101A	719001.17	632734.82	8.12	QUANTA RESOURCES	U	4	19	19	--
MW-102	718753.06	632914.91	6.62	QUANTA RESOURCES	U	4	19	19	2" - PVC
MW-103	718614.16	633202.67	6	QUANTA RESOURCES	U	6	21	21	2" - PVC
MW-104	718492.6104	633396.8502		QUANTA RESOURCES	U	4	12	12	2" - PVC
MW-105	718404	633554	5.04	QUANTA RESOURCES	U	9	19	19	2" - PVC
MW-106	718195	633436	7.17	LEVER BROTHERS	U	11	21	21	2" - PVC
MW-107	718371	632980	6.85	LEVER BROTHERS	U	13	23	23	2" - PVC
MW-108	718580	632735	7.17	LEVER BROTHERS	U	7.5	12.5	12.5	2" - PVC
MW-109	718036	633336	4.59	LEVER BROTHERS	U	15	20	20	2" - PVC
MW-110	719273	633109	11.48	CELOTEX	U	15	25	25	2" - PVC
MW-A-1	719109	633107	17.43	CELOTEX	C	24	28	28	4" - PVC
MW-A-2	719109	633184	18.66	CELOTEX	U	6	16	16	4" - PVC
MW-B	718908	633416	16.67	CELOTEX	U	9	19	19	4" - PVC
MW-C	718707	633648	19.86	CELOTEX	U	10	20	20	4" - PVC
MW-D	719010	633492	16.55	CELOTEX	U	7	12	12	4" - PVC
MW-E	718808	633570	16.48	CELOTEX	U	7	17	17	4" - PVC
MW-F	718809	633801	12.58	CELOTEX	U	7	17	17	4" - PVC
MW-G	719313	633336	15.14	CELOTEX	U	3	13	13	4" - PVC
MW-H	719212	633491	19.36	CELOTEX	U	4	14	14	4" - PVC
MW-I	719113	633799	20.39	CELOTEX	U	9.5	19.5	19.5	4" - PVC
MW-J	718912	634108	17.54	CELOTEX	U	8	18	18	4" - PVC

Table 3-1
Well Construction
Quanta Resources Site
Edgewater, New Jersey

Location	Northing	Easting	TOC Elevation	Property	Unconf'd or Conf'd	Top of Screen	Bottom of Screen	Total Depth (ft bgs)	Well Construction
MW-K	719315	633798	15.19	CELOTEX	U	6	16	16	4" - PVC
MW-L	719310	632952	16.38	CELOTEX	C	17	27	27	4" - PVC
MW-M	719625	633181	16.82	CELOTEX	C	18	23	23	4" - PVC
MW-N-1	719108	633030	13.33	CELOTEX	C	19.25	24.25	24.25	4" - PVC
MW-N-2	719210	633029	12.74	CELOTEX	U	5	10	10	4" - PVC
MW-N-3	--	--	--	CELOTEX	U	--	--	--	--
MW-O	--	--	--	CELOTEX	U	--	--	--	--
ACMW-1	719313	633413	12.56	CELOTEX	U	2	17	17	--
ACMW-2	--	--	--	CELOTEX	U	--	--	--	--
ACMW-3	719112	633568	15.58	CELOTEX	U	3	23	23	2" - PVC
ACMW-4	719212	633491	14.97	CELOTEX	U	--	--	--	--
DMW-1	--	--	--	CELOTEX	U	--	--	--	--
DMW-2	719214	633722	15.4	CELOTEX	U	21	31	31	--
P-1	718807	633339	16.87	CELOTEX	U	76	100	100	Open Hole

Note: 1) Data from RSI Report and from NJDEP well search records

Table 3-2
Summary of Ground Water Chemistry Data from Monitoring Wells in OU1
Quanta Resources Site
Edgewater, New Jersey

Parameter	ARARs		NJGWC N.J.A.C. 7:9-6	No. of Samples	Min. Conc. Detected (µg/L)	Max. Conc. Detected (µg/L)	Loc ID for Max. Conc. Detected	No. of Exceedences
	EPA MCL	NJDEP MCL						
VOCs								
Benzene	5	1	1	30	3	14,000	MW-102	18
Toluene	1,000	1,000	1,000	30	1.5	6,100	MW-103	3
Ethylbenzene	700	700	700	24	0.7	1,100	MW-103	1
Xylenes	10,000	1,000	1,000	24	3.9	5,000	MW-103	8
SVOCs								
Phenol	NA	NA	4,000	29	3.9	12,000	MW-102	1
2,4-dimethylphenol	NA	NA	100	29	10	19,000	MW-102	4
4-methylphenol	NA	NA	100***	29	5.7	32,000	MW-102	NA
2-methylphenol	NA	NA	100***	29	8.1	16,000	MW-102	NA
Styrene	100	100	100	30	860	1,200	MW-103	2
2-methylnaphthalene	NA	NA	100*	30	1.1	4,200	MW-102	NA
Carbazole	NA	NA	5***	30	11	140	MW-107	NA
Dibenzofuran	NA	NA	100	30	9.5	130	MW-107	NA
PAHs								
Naphthalene	NA	300	300*	30	6	23,000	MW-102	NA
Acenaphthene	NA	NA	400	30	5.6	870	MW-102	1
Acenaphthylene	NA	NA	100***	30	2.4	520	MW-102	NA
Anthracene	NA	NA	2,000	30	3.5	510	MW-102	NA
Benzo(a)anthracene	NA	NA	0.2*	30	0.9	350	MW-102	NA
Benzo(a)pyrene	0.2	0.2	0.2*	30	3.4	200	MW-102	2
Benzo(b)fluoranthene	NA	NA	10*	30	4.0	200	MW-102	NA
Chrysene	NA	NA	5*	30	5.8	260	MW-102	NA
Pyrene	NA	NA	200	30	2.3	830	MW-102	1
Phenanthrene	NA	NA	100*	30	2.4	2,300	MW-102	NA
Fluorene	NA	NA	300	30	2.4	946	MW-102	1
Fluoranthene	NA	NA	300	30	0.7	950	MW-102	1

Table 3-2 (Cont.)
Summary of Ground Water Chemistry Data from Monitoring Wells in OU1
Quanta Resources Site
Edgewater, New Jersey

Parameter	ARARs		NJGWQC N.J.A.C. 7:9-6	No. of Samples	Min. Conc. Detected (µg/L)	Max. Conc. Detected (µg/L)	Loc ID for Max. Conc. Detected	No. of Exceedences
	EPA MCL	NJDEP MCL						
PCBs								
PCBs (total)	0.5	0.5	0.5	4	ND	ND	NA	0
Inorganics								
Arsenic	10**	5**	8	30	13.4	20,900	MW-107	18
Chromium (total)	100	100	100	30	3.2	33.9	MW-31	0
Lead	15	15**AL	10	30	2.6	58.5	MW-20	5

Notes:

- 1) * = New Jersey DEP Interim Ground Water Criteria (IGWC).
- 2) *** = New Jersey DEP interim generic criteria (IGC).
- 3) ND = Not Detected.
- 4) NA = Not Available.
- 5) ** MCL as of 1/23/06.
- 6) No. of Exceedences does not include NJ IGWC.
- 7) An action level (AL) is not an MCL. It is a trigger point at which a remedial action is to take place.

Table 3-3
Soil Sample Distribution in OUI
Quanta Resources Site
Edgewater, New Jersey

SAMPLES					DETECTIONS														
					VOCs			SVOCs			Metals		PCBs		Pesticides				
	Total		Total		Detects	Total		Detects	Total		Detects	Total		Detects	Total				
Fill (9' to 18') - Includes Surface Soil	N (Total Samples)	109	N (Metals - 23)	8	Benzene	11	28	PAHs	70	73	Arsenic	92	100	1254	3	30	Dieldrin	1	11
	N (VOCs)	23	N (Metals - 13)	34	Toluene	13	23				Chromium	68	77	1242	10	30	Beta BHC	2	11
	N (VOC - hex.)	39	N (Metals - 11)	1	Ethylbenzene	14	23				Lead	75	77	1260	7	30	Delta BHC	2	11
	N (VOC - benz.)	5	N (Metals - 8)	4	Xylenes	16	23				*(other metals detected)		PCBs (total)	14	35	Gamma BHC	2	11	
	N (PAHs)	73	N (Metals - 7)	1				4,4'-DDD	1	11									
	N (PCBs)	35	N (Metals - 3)	27				4,4'-DDE	2	11									
	N (Pest)	11	N (Metals - 2)	3				Heptachlor Epox.	1	11									
	N (Metals)	100	N (Metals - 1)	22															
Sand / Silty Sand (10' to 15')	N (Total Samples)	12		Acetone	4	5	PAHs	12	12	Arsenic	12	12	None			None			
	N (VOCs)	5		Benzene	2	5				Chromium	12	12							
	N (PAHs)	12		Toluene	1	5				Lead	12	12							
	N (As, Cr, Pb)	11								*(other metals detected)									
	N (Metals - 13)	1																	
	N (Metals - 8)	1																	
Clay Silt / Silt Clay (20' to 70')	N (Total Samples)	16		Benzene	1	8	PAHs	16	16	Arsenic	14	16	PCBs	0	1	None			
	N (VOCs)	8		Toluene	2	8				Chromium	15	15							
	N (PAHs)	16								Lead	15	15							
	N (As)	16								*(other metals detected)									
	N (Cr)	15																	
	N (Pb)	15																	
	N (Cd)	1																	
	N (PCBs)	1																	
Sand (lower)	None			None			None			None		None		None					

Notes:

- 1) Data is from the following reports: RSI (GeoSyntec 2000); Soil Screening Survey (PSS 1990); Supplemental Data Submission (PSS 2002); Predesign Investigation (Parsons 1997).
- 2) Data represent samples that were collected on or near the Quanta "Site", where contamination may have been transported from the Quanta property.
- 3) N = Number of Samples Collected.

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Table 3-4
Summary of Soil Chemistry Data From OUI
Quanta Resources Site
Edgewater, New Jersey

	USEPA REGION 9 PRELIMINARY REMEDIATION GOALS		NJDEP SOIL CLEANUP CRITERIA			No. of Samples	Min. Conc. Detected (mg/kg)	Max Conc. Detected (mg/kg)	Loc ID for Max Conc. Detected	No. of Exceedences
	RESIDENTIAL	INDUSTRIAL	RDCSCC	NRDCSCC	IGWSCC					
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg					
VOC										
Benzene	0.64	1.40	3	13	1	41	0.15	51.0	TP-14	12 ⁽⁴⁾
Ethylbenzene	400	400	1000	1000	100	36	0.14	290	TP-14	2 ⁽⁴⁾
Toluene	520	520	1000	1000	67	36	0.52	310	TP-14	1 ⁽⁴⁾
Trichloroethene	0.05	0.11	23	54	1	36	0.54	0.54	B8-AS1 (0.0-0.5, Fill)	1 ⁽¹⁾
Xylene (total)	270	420	410	1000	100	36	0.11	200	T-4 (10, Fill)	2 ⁽⁴⁾
SVOC										
Acenaphthene	3700	29000	3400	10000	100	101	0.0086	1500	T-8 (2, Fill)	19 ⁽⁴⁾
Acenaphthylene						101	0.018	260	MW-105 (5, Fill)	
Anthracene	22000	100000	10000	10000	100	101	0.0100	1400	MW-105 (5, Fill)	19 ⁽⁴⁾
Benzo(a)anthracene	0.62	2.10	0.9	4	500	101	0.033	2100	MW-105 (5, Fill)	75 ⁽²⁾
Benzo(a)pyrene	0.06	0.21	0.66	0.66	100	101	0.037	2500	T-1 (3, Fill)	82 ⁽¹⁾
Benzo(b)fluoranthene	0.62	2.10	0.9	4	50	101	0.044	2800	T-1 (3, Fill)	76 ⁽²⁾
Benzo(g,h,i)perylene						101	0.013	1400	T-1 (3, Fill)	
Benzo(k)fluoranthene	6.2	21	0.9	4	500	101	0.014	1100	T-1 (3, Fill)	
Chrysene	62	210	9	40	500	101	0.042	2300	MW-105 (5, Fill)	65 ⁽²⁾
Dibenzo(a,h)anthracene	0.06	0.21	0.66	0.66	100	101	0.031	390	T-1 (3, Fill)	34 ⁽²⁾
Fluoranthene	2300	22000	2300	10000	100	101	0.041	3600	T-1 (2, Fill)	51 ⁽¹⁾
						101	0.041	3600	MW-105 (5, Fill)	23 ⁽⁴⁾
Fluorene	2700	26000	2300	10000	100	101	0.027	1400	MW-105 (5, Fill)	
Indeno(1,2,3-cd)pyrene	0.62	2.10	0.9	4	500	101	0.016	1500	T-8 (2, Fill)	17 ⁽⁴⁾
Naphthalene	56	190	230	4200	100	101	0.041	5300	T-1 (3, Fill)	42 ⁽¹⁾
Phenanthrene						101			T-1 (3, Fill)	24 ⁽⁴⁾
Pyrene	2300	29000	1700	10000	100	101	0.043	3300		
						101	0.043	3300	MW-105 (5, Fill)	21 ⁽⁴⁾
Metals										
Arsenic	0.39	1.6	20	20	*	128	0.0072	3370	C-79 (6.5, Fill)	102 ⁽¹⁾
Chromium	210	450	120000	Not Regulated	No Criterion	127	0.0060	676	MW-106 (18, Clayey Silt)	1 ⁽¹⁾
Lead	400	800	400	600	*	127	0.1	10800	(18, Clayey Silt)	
PCB										
PCBs ¹	0.22	0.74	0.49	2	50	36	0.086	3.2	T-6 (6, Fill)	17 ⁽²⁾
									SS-04 (0, Fill)	29 / 5 ⁽²⁾

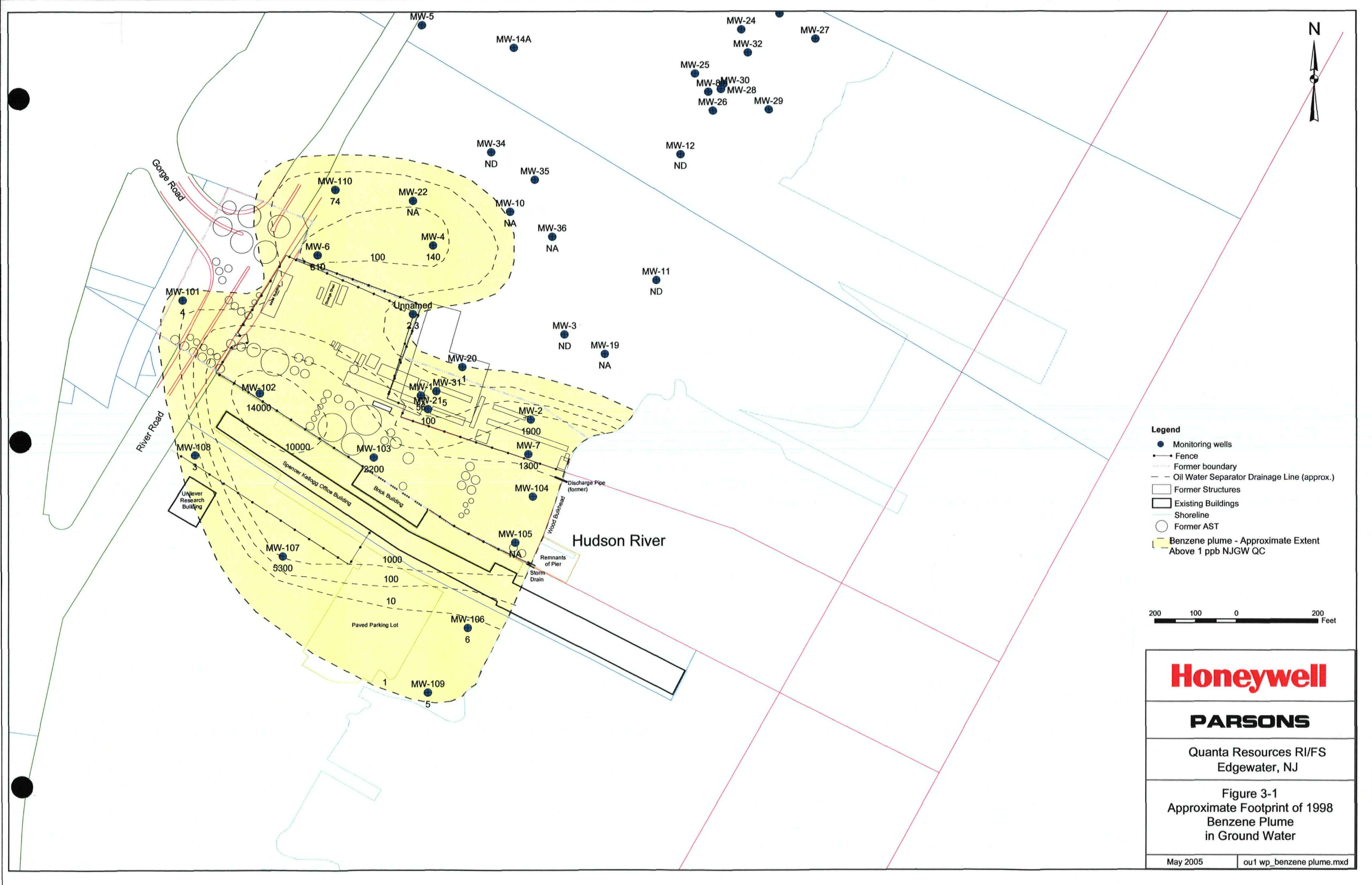
1. Indicates unspecified mixture, high risk PCBs.

2. * Site specific number.

3. Exceedences were based on the following: (1) PRG Industrial, (2) RDCSCC, (3) NRDCSCC, and (4) IGWSCC

FIGURES

- Figure 3-1 Approximate Footprint of 1998 Benzene Plume in Groundwater
- Figure 3-2 Approximate Footprint of 1998 Naphthalene Plume in Groundwater
- Figure 3-3 Approximate Footprint of 1998 2,4-Dimethylphenol Plume in Groundwater
- Figure 3-4 Approximate Footprint of 1998 Styrene Plume in Groundwater
- Figure 3-5 Approximate Footprint of 1998 Benzo(a)pyrene Plume in Groundwater
- Figure 3-6 Approximate ORP Distribution in 1998 in Groundwater
- Figure 3-7 Approximate Footprint of 1998 Arsenic Plume in Groundwater
- Figure 3-8 Summary of Soil Chemistry Results (OU1)



- Legend**
- Monitoring wells
 - Fence
 - Former boundary
 - Oil Water Separator Drainage Line (approx.)
 - Former Structures
 - Existing Buildings
 - Shoreline
 - Former AST
 - Benzene plume - Approximate Extent Above 1 ppb NJGW QC

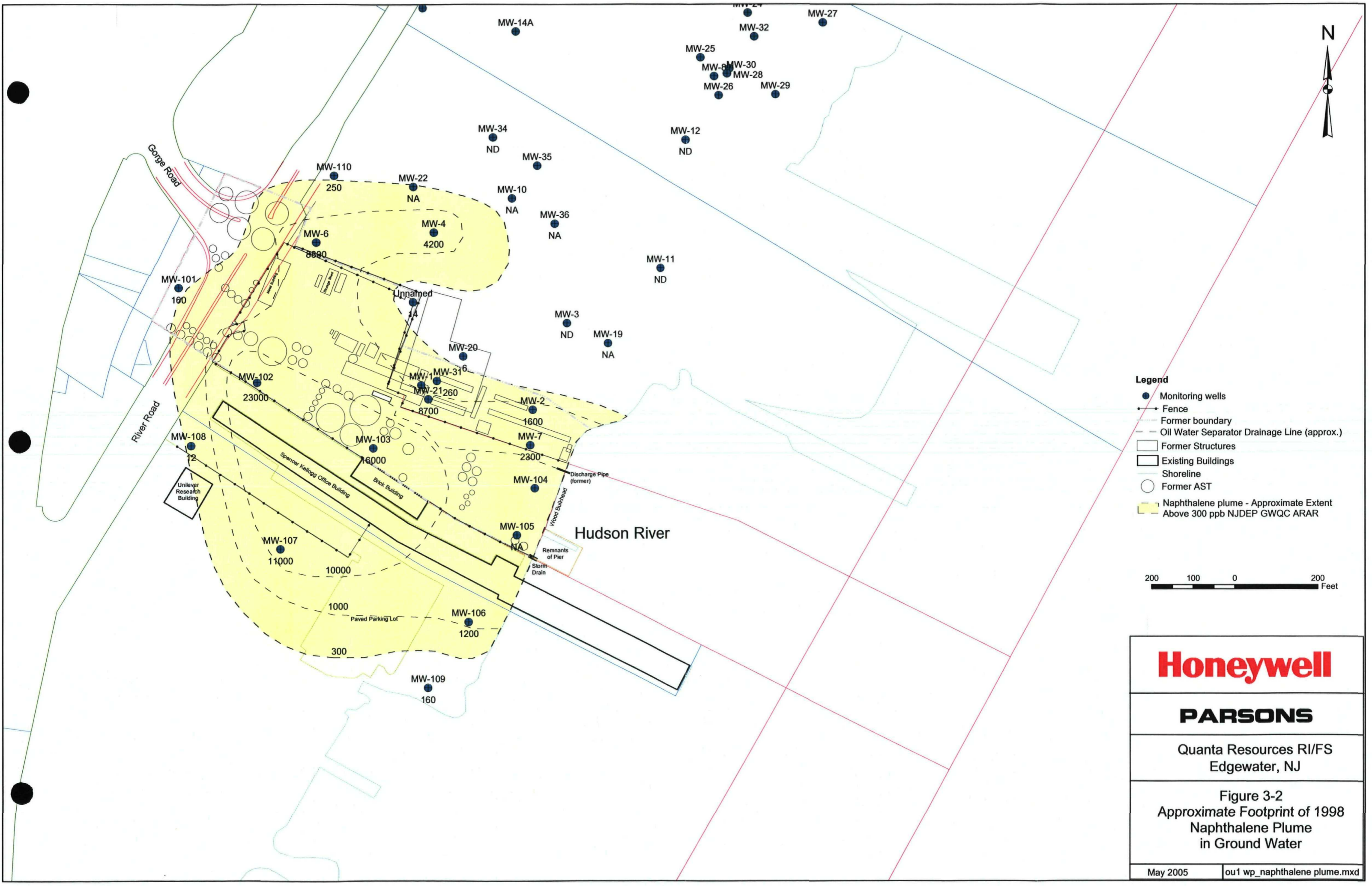
200 100 0 200 Feet

Quanta Resources RI/FS
Edgewater, NJ

Figure 3-1
Approximate Footprint of 1998
Benzene Plume
in Ground Water

May 2005

ou1 wp_benzene plume.mxd



- Legend**
- Monitoring wells
 - Fence
 - Former boundary
 - Oil Water Separator Drainage Line (approx.)
 - Former Structures
 - Existing Buildings
 - Shoreline
 - Former AST
 - Naphthalene plume - Approximate Extent Above 300 ppb NJDEP GWQC ARAR

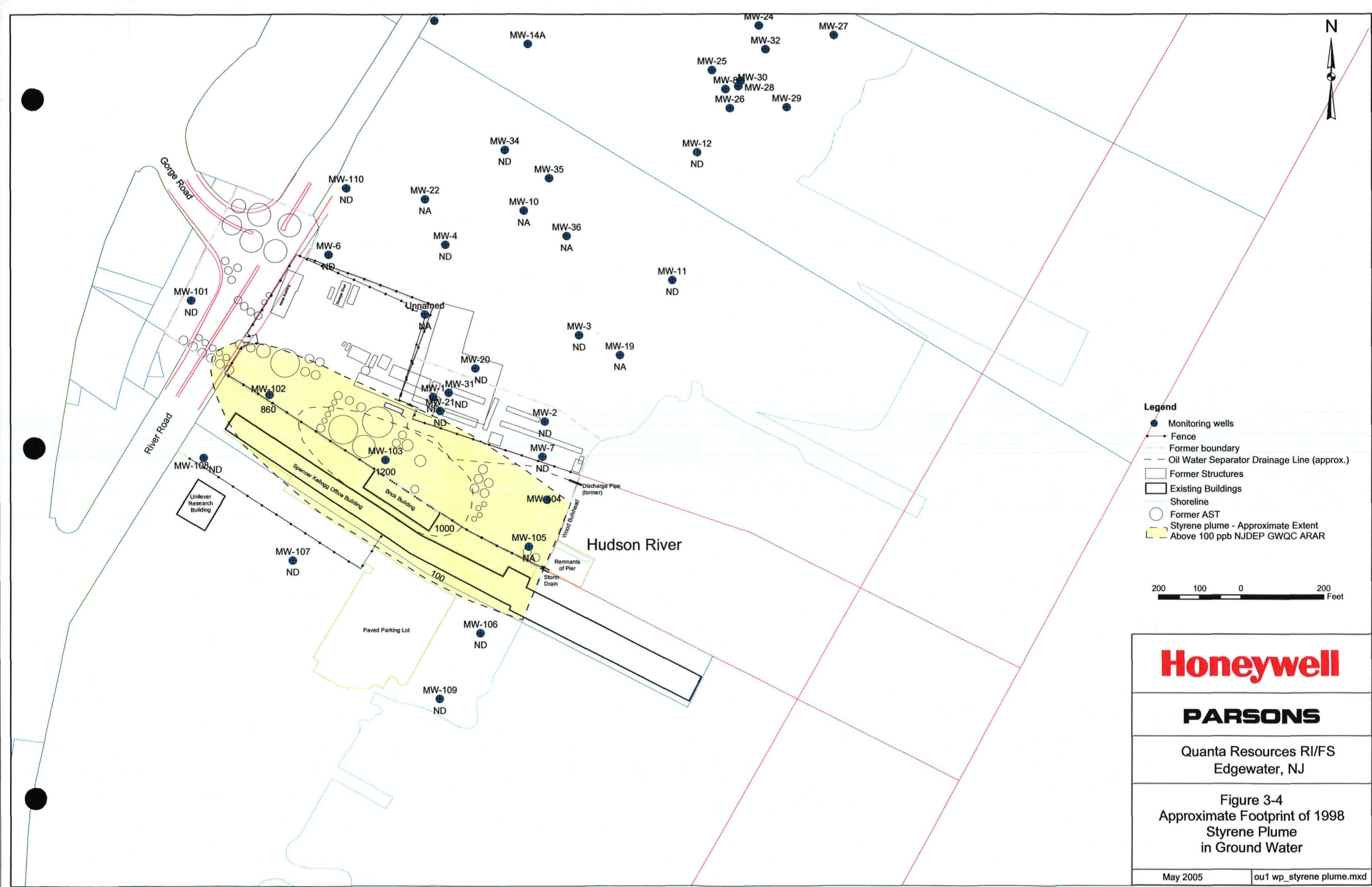
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Figure 3-2
Approximate Footprint of 1998
Naphthalene Plume
in Ground Water

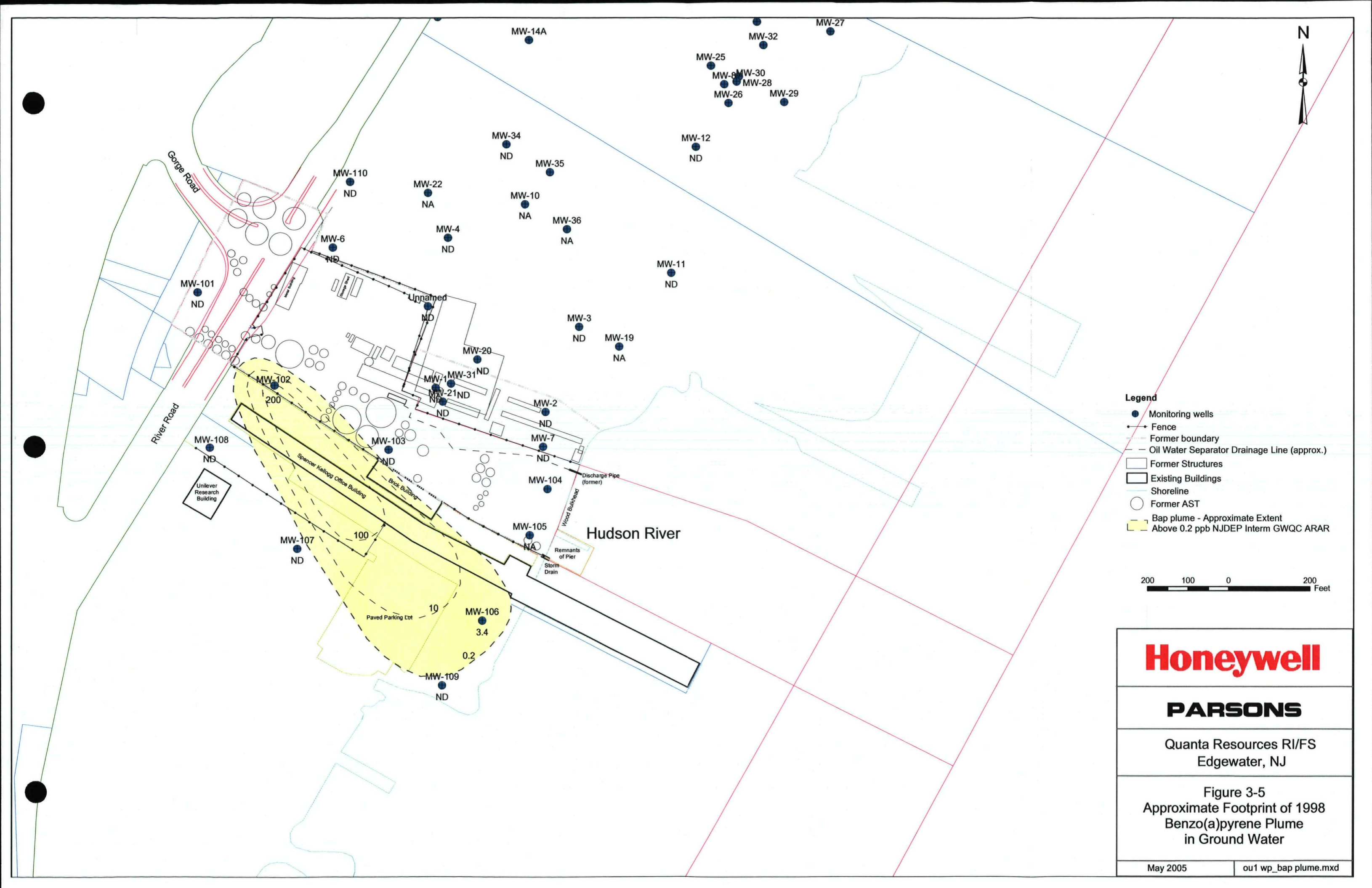


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Figure 3-4
Approximate Footprint of 1998
Styrene Plume
in Ground Water

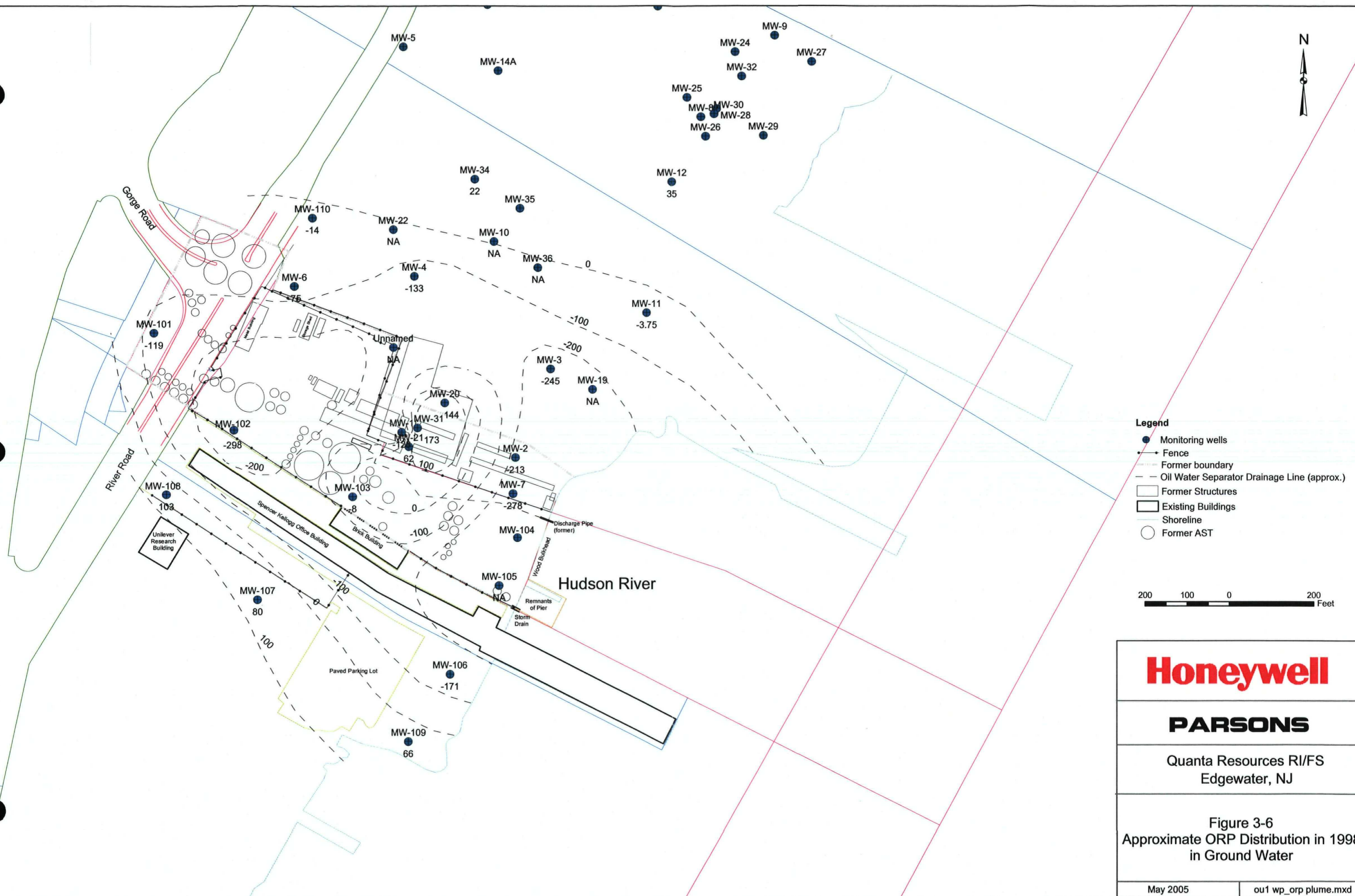


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Quanta Resources RI/FS
Edgewater, NJ

Figure 3-5
Approximate Footprint of 1998
Benzo(a)pyrene Plume
in Ground Water

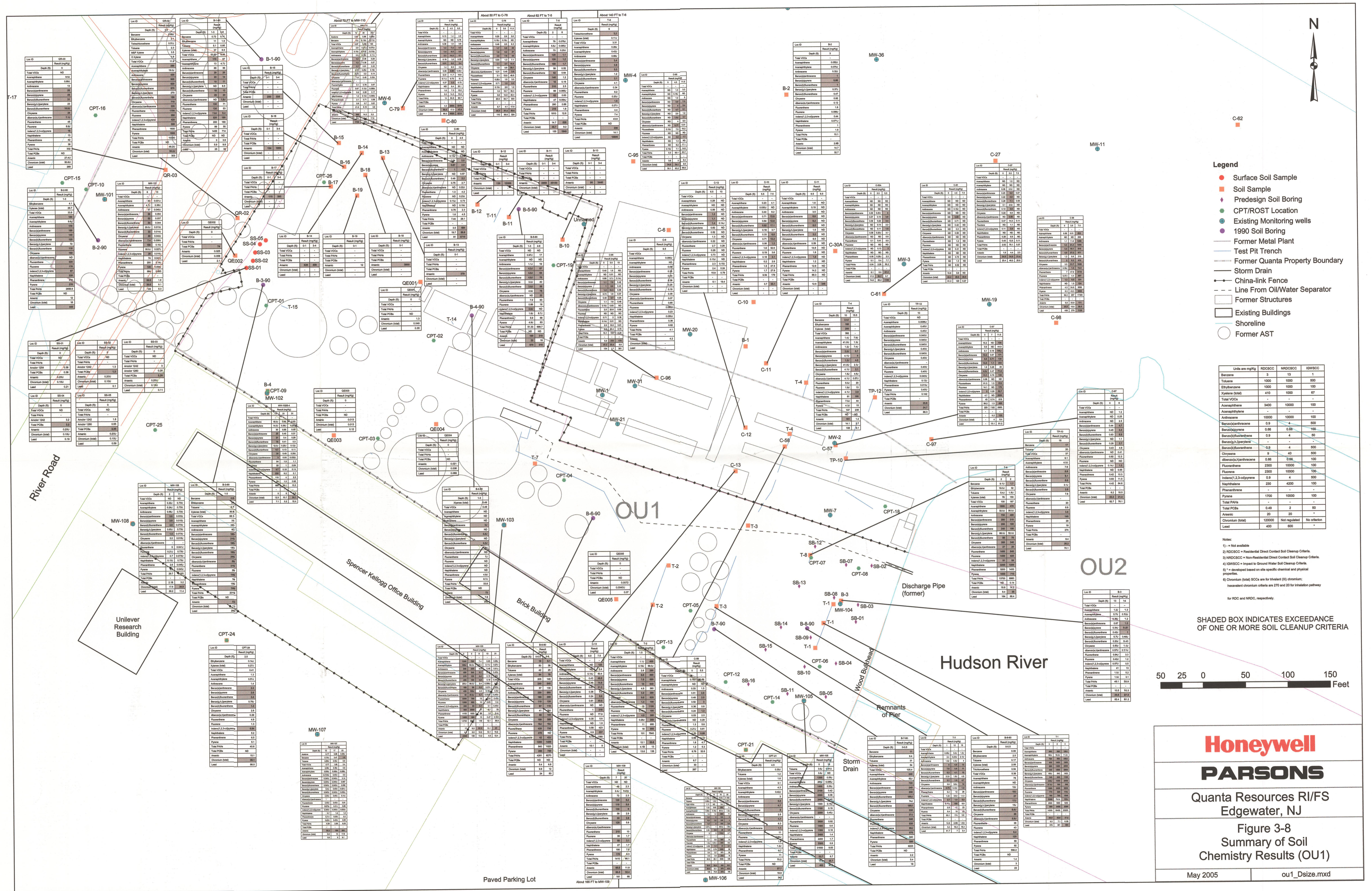


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Edgewater, NJ

Figure 3-6
Approximate ORP Distribution in 1998
in Ground Water



SECTION 4

CONCEPTUAL MODEL AND WORK PLAN RATIONALE

4.1 SITE CONCEPTUAL MODEL

The existing conceptual model for OU1 was reviewed as part of the development of this work plan, and where appropriate, additional clarifying information was added to make the model more comprehensive with regard to all of the environmental media and current site conditions. A diagram of the Conceptual Site Model (with sources, release mechanisms pathways, and receptors) is provided as Figure 1-1 in the OU1 QAPP. The OU2 river model of sedimentation and migration of materials from the Site are described in the OU2 RI Work Plan.

The initial conceptual model called for development of the site in three stages. Prior to individualized development, the area now known as the Quanta Site was a broad marshland with low topographic relief sloping gradually to the riverbank of the Hudson River. Initial industrial development resulted in installation of a wooden pile bulkhead and backfill of 10 or more feet of non-native fill (marsh reclamation). In the Uplands Area (OU1), releases from tar stills, oil storage tanks and other vessels were sources of NAPL in subsurface soils and on the ground water table. The NAPL releases to the subsurface soils on the site are also a likely source for the dissolved plumes of VOCs, SVOCs, (predominantly PAHs) and metals. Figures 3-1 to 3-7 represent the current state of key contaminant constituent plumes under the Site as a whole (Quanta and other properties), and include the LNAPL and DNAPL product plumes at or below the water table. Ground water and NAPL represent potential contaminant migration pathways to the Hudson River, and potentially to the lower sand beneath the confining unit. Artificial conduits (e.g., buried pipes and sewer lines) are potential contaminant pathways for migration for NAPL and plumes. The degree to which these pathways represent constituents emanating from the Quanta Property is to be determined in this phase of the investigation.

As a result of the EPA removal actions, all primary sources have reportedly been removed. Secondary sources are limited to the concentrations of contaminants in residuals that are absorbed to the soil/fill material and existing as LNAPL or DNAPL near the water table. These secondary sources will be further investigated to see if they pose a significant threat to human health on the Site, based on the lack of exposure points and current or anticipated land use. However, the additional data collected will be used to characterize potential direct contact exposure scenarios and volatilization risks from VOC movement into buildings, as part of the assessment of future Site use risks. Movement of contaminants along artificial conduits is a potential migration pathway for ground water or NAPL to indoor air.

Ground water is not known to be used for any purpose in the vicinity of the Site. A review of the NJDEP's Public Community Water Supply (PCWS) database indicated that the nearest public water supply well is located 5.1 miles north-northwest of the site in Bogota, New Jersey. Based on previous study results, leaching of contaminants to groundwater has occurred. However, the extended period that the Site has been inactive has provided a time period for natural attenuation processes to potentially reduce or sequester mobile chemicals.

Since considerable time has elapsed since operations ceased on Site and some contaminant discharge has been stabilized, the additional RI data can be used to construct a more current model that incorporates degradation changes, and further defines the aerial extent and migratory potential of product layers, along with an exposure assessment that more clearly defines reasonably anticipated future use cleanup scenarios, which mitigate the impacts to human health and to potential downgradient ecological receptors.

4.2 WORK PLAN RATIONALE

4.2.1 OU1 Data Needs

The data needs for OU1 are based on the Data Quality Objectives provided in Section 1.4.1 of the OU1 QAPP. The objectives are focused around filling in data gaps that exist in the site characterization information gathered during the numerous previous investigations that have been performed on the Quanta Site.

Generally, the conditions to be investigated at the Site include the following:

- LNAPL and DNAPL in Upland Area (OU1),
- Contaminants in surface and subsurface soils,
- Dissolved contaminants in the ground water zones (including the lower sand unit below the confining unit),
- Indoor Air (through a phased tier approach as defined by USEPA guidance),
- Artificial conduits (underground pipes, sewer lines, etc.) on the Quanta property and on the former Spencer Kellogg and Unilever properties,
- Metals contamination and migration from the General Chemical Company,
- Metal plating facility, and
- PCBs associated with oil storage at the site.

Thus, the data quality needs are to determine the physical and chemical conditions at the Quanta Site and if there are risks posed to human health and the environment because of these conditions. In particular, the specific objectives of the RI are:

- Characterize potential soil and groundwater impacts that may exist that are associated with the former operations at the Quanta Site,
- Evaluate the potential for human health and ecological impacts associated with the former operations at the Quanta Site, and
- Develop sufficient data to determine the need for and to allow a screening of appropriate remedial alternatives, make a recommendation of the most appropriate remedial alternative only after a public comment process and the USEPA will be responsible for selection of the final remedial alternative, and the development of a conceptual plan.

Based on the results developed for this RI, it must be determined if unacceptable human health and ecological risks exist due to current and potential exposure to OU1 contaminants.

4.2.2 Work Plan Approach

Since there exists environmental data for the site in ground water and soil (OU1), the approach used in the RI sampling program is designed to fill in data gaps that exist in the characterization of the contaminants.

Soils are not well characterized or delineated on the site so a systematic sampling design (e.g., roughly equally spaced points) is proposed for soils.

Ground water on the site has been characterized during previous investigations, however, the extent of the impacts need to be defined in the following areas: 1) upgradient areas, 2) areas to the south on the Unilever property, 3) confined sands below the clay silt unit (although no significant impacts are expected in this hydrostratigraphic unit, given that the clay silt is an aquitard) and 4) the bedrock (bedrock will be investigated if the confined sands unit is significantly contaminated).

SECTION 5

REMEDIAL INVESTIGATION SCOPE

This section describes the overall approach, rationale, and data used for the RI activities at OU1 (Upland Area). The RI activities are being conducted in accordance with the USEPA Administrative Orders on Consent for OU1. Table 5-1 provides a summary of soil and ground water samples to be collected as part of this RI. The tables include the analytical parameters to be analyzed in each sample and the recommended sample depth. A detailed description of the sampling and analytical methods is presented in the Field Sampling Plan (FSP) in Appendix A. Chemical analyses will be conducted by a USEPA Certified Laboratory Program (CLP)-certified laboratory, or equivalent, that will provide CLP or SW846 data deliverable documentation necessary for data validation; the lab will also be NJDEP-certified. The RI scope of work is based on a significant volume of existing characterization data at the Quanta Site, which were discussed in Section 2, and based on the Data Quality Objectives for the major investigation tasks identified in Section 1.4.1 of the OU1 QAPP.

5.1 MOBILIZATION

The field team leader will arrange a site reconnaissance meeting with site representatives from Honeywell, the QSAG PRP Group, various utility locators, and the subcontract driller prior to the start of intrusive site investigation activities. Underground utilities will be identified and cleared for intrusive work. Areas for a decontamination pad and investigation derived waste storage will be selected. Planned investigation activities will be coordinated with the Honeywell site representative and adjacent property owners, so as not to interfere with other ongoing activities at the Quanta Site.

5.2 OU1 (UPLAND AREA)

5.2.1 Soil Borings and Sampling

It is noteworthy that much of the existing soil chemistry data is from locations on properties that are adjacent to the Quanta property. Therefore, additional soil chemistry data from soil borings on the Quanta property and selected locations on adjacent properties will be collected during the RI.

A cursory literature review for background data indicated that there was insufficient data to establish background. Due to the difficulty collecting "clean" background concentrations in the proximity of the Quanta Site given the long industrial history of the area, reference samples are more reasonable approach. Four reference locations (four samples collected at each location) are proposed. The actual field location will be decided prior to the start of fieldwork by agreement with Honeywell / QSAG and the USEPA.

Surface and subsurface soil samples will be collected from thirty-six soil borings performed during the installation of permanent monitoring wells and soil borings. The soil data will be used to fill in data gaps and delineate the distribution contaminants in soil. The rationale for soil sampling is provided on Table 5-1. Figure 5-1 shows the locations of the proposed soil borings

(i.e., wells) and other environmental samples. All of the soil samples will be collected from soil borings performed during the installation of the wells. Together, the semi-grid pattern of the soil borings (wells) selected for chemical analyses will provide results that will be used for horizontal and vertical delineation.

Soil samples will be collected from soil borings: SB-1, SB-2, SB-3, SB-4, SB-5, SB-6, SB-7, SB-8, SB-9, SB-10, SB-11, SB-12, SB-13, SB-14, SB-15, SB-16, SB-17, and SB-18.

Soil samples will be collected from the borings performed during the installation of the following permanent monitoring wells: MW-101DS, MW-102B, MW-103DS, MW-105A, MW-106A, MW-107DS, MW-109A, MW-111B, MW-112B, MW-113B, MW-114B, MW-115B, MW-116DS, MW-117B, MW-118B, MW-119B, MW-120B, and MW-121B.

At each boring location, soil samples will be collected from the following depths: 1) 0-2 inches (for risk assessment purposes), 2) just above the water table, and 3) a depth selected in the field based on field screening evidence and visual observations, and 4) 2 feet into the clay silt confining unit for vertical delineation. In addition, four deep sand soil samples (just above the bedrock and below the clay/silt layer) will be collected from MW-101DS, MW-103DS, MW-107DS, and MW-113DS. The subsurface soil samples for chemical analyses will be collected from a discrete 6-inch interval.

Field screening to determine if NAPL is present will consist of visual observations and field screening techniques. If NAPL is visible, no further action is needed. However, if NAPL is not visible the soil will be screened with a PID. If the PID reading is greater than 100ppm, the sample will be further tested with a Sudan IV Kit and/or UV Fluorescence Methods. A flow chart that describes the steps that will be taken to determine the presence of NAPL is in presented in Figure 5-2.

Samples as specified in Table 5-1 will be submitted to the analytical laboratory for chemical and geotechnical analyses. The analytical methods are listed in the FSP (Appendix A). All samples will be analyzed for the following chemical parameters: VOCs, SVOCs, PCBs, arsenic, hexavalent chromium, (total chromium on one sample in the unsaturated zone per boring and in the four deep sand samples noted above) and lead. The samples collected from just above the water table will also be analyzed for grain size, which will be used to assess the significance (saturation and volume) of any LNAPL measured in the monitoring wells. In addition, the following sampling and analysis will be conducted at OU1:

- Soil samples in the vicinity of the former ammonia storage tank will be sampled for ammonia (MW-101DS, MW-111B, MW-112B, SB-12 through SB-15).
- Soil samples from five locations (SB-10 through SB-13 and SB-15) will be analyzed for all TAL Metals.
- Pesticides will be analyzed in all soil samples collected from six geographically spaced locations (MW-101, MW-103, MW-111, MW-112, MW-113, and MW-117).
- Deep sand soil samples will be analyzed for VOCs, SVOCs, PCBs, hexavalent chromium, total chromium, arsenic, and lead.

In addition, at six borings along the bulkhead, samples of the upper portion of the clay silt-confining unit will be collected and tested for Atterberg limits. (Table 5-1) The Atterberg limits test will establish basic index information about the soil and will be used to estimate strength and settlement characteristics. It is the primary form of classification for cohesive soils.

Three deep sand borings (MW-103DS, MW-107DS, and MW-116DS) will be drilled to bedrock. In the event that DNAPL or other significant contaminant is present in the lower sand (based on visual observations, PID readings, Sudan IV test kits, UV fluorescence methods and/or analytical results) then detailed investigation of the distribution of the contaminants in the overburden above the bedrock near the area of concern will be conducted. This additional information will provide guidance as to the number and placement of bedrock wells.

The proposed depths of the soil borings are dependent on the monitoring well specifications listed in the following section. Drilling depths may be modified based on field conditions encountered. Split spoon samples will be collected continuously during the drilling. The split spoon samples will be visually described for physical characteristics following the ASTM Designation D2488, "*Standard Practice for Description and Identification of Soils (Visual-Manual Method)*" and Munsell Color Charts. The samples will be screened with a photo ionization detector (PID), and selective samples will be analyzed for the presence of NAPL using Sudan IV field screening kits or UV fluorescence methods; samples will also be visually assessed for field evidence of impacts. The soil boring and sample collection methods are described in the FSP (Appendix A).

In addition, one soil sample will be collected at depth corresponding to the depth of the material listed as coal tar in the boring log for well MW-101 (SB-11). The sample will be analyzed for PAHs.

Additional sampling locations will be added to the West and South, where delineation is not yet complete, based on the results of nearby sample locations.

In the event that a confining unit (i.e., clay/silt unit) is not present or less than 2-feet thick, then a maximum of two additional samples will be collected in that boring until field screening evidence indicates that contamination is not present in the subsurface soil (i.e., the contamination has been vertically delineated).

5.2.2 Permanent Monitoring Well Installation

It is noteworthy that many of the existing permanent monitoring wells on and near the Quanta property are screened below the water table (at the base of the sand/silty sand), and that very few wells are installed to monitor water table conditions. Additional water table wells will be installed during the RI.

Thirty-three ground water monitoring wells will be installed at the site to fill in data gaps and delineate the existing plumes in ground water (Table 5-1). The rationale for installation of these wells is also provided on Table 5-1. Figure 5-1 shows the locations of the proposed wells. The new wells to be installed include water table wells (designated "A"), wells installed across

the water table and at the top of the silt/clay (designated "B"), and wells installed in the deep sand (designated "DS").

Sixteen 4-inch PVC wells (MW-103A, MW-105A, MW-106A, MW-107A, MW-109A, MW-111A, MW-112A, MW-113A, MW-114A, MW-115A, MW-116A, MW-117A, MW-118A, MW-119A, MW-120A, and MW-121A) will be paired with new or existing wells that are screened at the top of the silt/clay.

Twelve 4-inch PVC wells (MW-102B, MW-111B, MW-112B, MW-113B, MW-114B, MW-115B, MW-116B, MW-117B, MW-118B, MW-119B, MW-120B, and MW-121B) are proposed in perimeter and interior locations throughout the known plumes (Figure 6-1 and Table 6-1). In addition, well MW-104 will be replaced since it has been damaged.

Five 2-inch double-cased PVC wells (MW-101DS, MW-103DS, MW-107DS, MW-113DS, and MW-116DS) will be installed in the deep sand unit below the silt/clay-confining unit (Figure 5-1 and Table 5-1). These five additional deep wells will be installed as pairs to next to MW-101, MW-103, MW-107, MW-113, and MW-116, respectively) to evaluate the deeper ground water zone below the clayey silt / silt clay confining unit. This will supplement data from MW-31, the other well screened below the confining unit on the Quanta Site. There is sufficient evidence to indicate that the clayey silt / silt clay unit is an aquitard [i.e., 1) it is a continuous unit, has a thickness of approximately 20 feet as confirmed in two soil borings (B-4 and B-3), and 2) it has been shown to have a very low hydraulic conductivity ($10E-8$ cm/sec)]. Thus, only limited investigation is proposed below the confining unit and the remaining investigation is focused on the upper ground water zone in the fill and sand/silty sand.

Deep sand well (MW-106DS) will be provisionally installed next to MW-106. MW-106DS will be installed if the results of other five deep sand wells indicate further investigation of the deep sand aquifer is necessary.

For "A" wells, the well screen will be set across the water table. For "B" wells, a 2-foot sump will be installed into the silt/clay so the bottom of the well screen is at the sand and clay/silt interface and across the water table, with a maximum of 10 feet of screen. Well construction details are specified in the FSP in Appendix A.

The five deep wells installed below the confining unit will be double-cased wells. An outer steel casing will be set into the top of the clay/silt-confining unit to prevent cross contamination from the shallow ground water zone. Then a 2-inch ID PVC 20-slot (0.02-inch) wire wrap well screen and riser will be installed below the bottom of the confining unit using hollow stem augers or mud rotary drilling. The bottom of the screen will be placed on the top of the bedrock and will extend up to the bottom of the confining unit. The annular space between the well riser and the confining unit will be grouted to prevent cross contamination.

The new and existing monitoring wells will be developed prior to sampling in accordance with the USEPA's guidelines (EPA Ground Water Forum, 1992). Each monitoring well will be developed until the water is turbid free, using the methods described in USEPA guidance.

The development water will be contained in 55-gallon drums and stored onsite. Purge water will be considered investigation of derived waste and disposed of in accordance with Federal and State of New Jersey regulations. The specific capacity of the well will be measured during development. If the development criteria have not been met, the data will be reviewed to determine whether development is considered completed or whether additional development or a change in development method is required. Development will not start until 24 hours have passed since the installation of the well.

The wells will be surveyed by a New Jersey-licensed land surveyor and NJDEP well certification Forms A and B will be completed.

5.2.3 NAPL and Water Level Measurements

Synoptic water levels will be measured in each of the permanent monitoring wells. The measurements will be used to construct ground water contour maps and evaluate vertical gradients. LNAPL and DNAPL measurements will be made at the same time. The ground water elevations in wells with LNAPL will be corrected for the presence of LNAPL using the specific gravity measurement of the LNAPL in the well.

The following field methods, as described in Section 5.2.1 and the Flow Chart (Figure 5-2), will be used to determine the presence or likelihood of residual and free phase NAPL:

- Visual Observation;
- PID Readings;
- Sudan IV Kits; and
- UV Fluorescence.

5.2.4 Ground Water Sampling

Quarterly ground water samples will be collected from the wells for one year to determine the seasonal variability of contaminant concentrations. After one year of ground water sampling, the frequency will be revised as needed. As noted above, a synoptic round of water levels will be measured in each of the monitoring wells before any sampling activities are conducted. After the round of water level measurements are completed, each well will be purged using low-flow techniques as described in the *USEPA Region II Groundwater Sampling Procedure, Low Stress, (Low Flow) Purging and Sampling* (1998). The low flow sampling method is described in detail in the FSP (Appendix A). If the well is not capable of maintaining the pumping rate for sampling, the ground water will be sampled intermittently allowing it to recover between sample collection attempts. VOCs samples will be collected on the same day as the purging was performed even if the well has not recovered to within 80% of static levels. Wells known to have slow recharge rates will be purged early in the day to allow the maximum time for recovery and sampling that day.

Ground water samples will be collected from each of the new and existing monitoring wells at the Site (Table 5-1). Each ground water sample will be analyzed for VOCs, SVOCs (including PAHs), PCBs, arsenic and lead (Table 5-1). Ground water samples will be analyzed for pesticides at monitoring wells MW-101A, MW-103, MW-103A, MW-11a, MW-111B,

MW-112A, MW-112B, MW-113A, MW-113B, MW-117A, and MW-117B. In addition, ground water samples will be analyzed for ammonia at monitoring wells MW-101A, MW-111A, MW-111B, MW-112A, MW-11B, MW-A-2, and MW-L.

The field parameters measured during purging will be measured and recorded during ground water sampling. Observations of turbidity, free product, and odor will also be recorded. If NAPL is present in the monitoring wells, and it can be removed, the ground water will be sampled for dissolved parameters. The analytical methods are listed in the FSP (Appendix A).

All purge water will be collected and staged with the well development water. All purge water will be investigated during a investigation of derived waste and disposed of according to Federal and State of New Jersey regulations.

5.2.5 NAPL Sampling

The distribution of NAPL in the monitoring wells will be determined based on measurements with an oil/water interface probe. Select NAPL samples will be collected from geographically spaced areas and that appear to exhibit different characteristics for fingerprint analysis, interfacial tension, surface tension, specific gravity, density, viscosity, and PCBs. These samples will include a representative number of LNAPL and DNAPL samples and will be representative of NAPL from the various properties that comprise the Site. Adjusted product thicknesses will be determined from bail down tests and soil porosity, which will then be used to determine product volumes and other remedial characteristics (e.g., recoverability).

If free product is found in any of the monitoring wells, and after NAPL parameters are defined, an interim remedial measure (IRM) to bail and properly dispose of NAPL on a periodic basis during the RI/FS may be implemented by Honeywell.

5.2.6 In Situ Hydraulic Conductivity Tests

In situ hydraulic conductivity "slug" tests will be conducted on 14 monitoring wells (MW-102 A/B, MW-103A/B/DS, MW-107-A/B/DS, MW-113A/B/DS, and MW-116A/B/DS). The selected wells will have geographic and vertical distribution throughout the known plumes on the Site. A rising head slug test method will be used for wells that straddle the top of the water table. Either the rising head or falling head slug test method may be used in the deep wells if the wells screens are fully submerged. Manual measurements will also be collected during the slug test to confirm the transducer and data logger have functioned properly during the test. In the case of a malfunction, the manual data may be used in the slug test analysis in lieu of transducer obtained data, to determine the hydraulic conductivity of the formation. The slug testing procedures are described in the FSP (Appendix A).

5.2.7 Tidal Study for Mean Hydraulic Gradient

A tidal study will be conducted on the Site to determine the magnitude and extent of tidal influence on the water table ground water zone, and to determine the mean hydraulic gradient in accordance with the NJDEP Technical Requirements for Site Remediation, N.J.A.C. 7:26E-4.4(h)3,ii(3). The study will coincide with the monitoring well installation program and will include measurements in permanent monitoring wells from each monitoring horizon.

Hourly ground water level data will be collected in wells (without appreciable free LNAPL) and in a surface water tidal gauging station (TGS) using transducers and data loggers over a 72-hour period. The hourly groundwater levels are consistent with data that is required to determine the average groundwater gradient using the method of Serfes (1991) of the New Jersey Geological Survey. The tidal study procedures are described in the FSP (Appendix A).

Prior to the tidal measurements, a tidal gauging station (TGS-1) will be installed on the Spencer Kellogg pier at a location that is beyond the low tide elevation in the Hudson River. The TGS will be installed as described in the FSP (Appendix A).

5.2.8 Building Survey for Potential Impacts to Indoor Air Quality

A building survey and indoor air investigation will be undertaken at the commercial building located at 115 River Road to address potential impacts to indoor air quality. The investigation will be performed by 115 River Road, LLC using Environmental Waste Management Associates, LLC (EWMA) in order to better control the access and coordination with tenants.

A detailed work plan has been developed by EWMA for this work and it is included as Attachment A to this Work Plan. The general components of the work plan are documented in this RI/FS Work Plan for OU1; however, it should be noted that the indoor air investigation is being conducted independently by EWMA for 115 River Road, LLC. The work product and data generated from the EWMA investigation will be evaluated by Honeywell, QSAG, and USEPA to determine if it is acceptable for use in the risk assessment portion of the Quanta RI. It is recognized that USEPA reserves the right to reject the data if it is not acceptable.

The scope of work for the vapor intrusion investigation was developed by EWMA and it is based on the guidance in the November 2002 document "*Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils*" issued by USEPA Office of Solid Waste and Emergency Response (OSWER). In addition, the existing interim "*Vapor Intrusion Pathway – Indoor Air Guidance*" issued by New Jersey Department of Environmental Protection (NJDEP) was used as a reference.

The vapor intrusion investigation will target volatile organic compounds (VOCs), as these are the compounds that have the potential to migrate in the vapor phase in this site setting. Due to limiting chemical and physical properties, the compounds associated with semivolatile organic compounds (SVOCs) and metals do not easily volatilize at ambient temperatures and are not anticipated to be of concern during the vapor intrusion investigation.

OSWER's guidance document outlines a three-tiered approach to adequately determine the nature and extent of contamination, and identify potential exposure pathways and receptors that may be at risk from vapor intrusion. Tier 1 involves primary screening based on general knowledge of the site and chemicals known or reasonably suspected to be present in the subsurface. Tier 2 involves secondary screening based on some limited site-specific information about the contamination source and subsurface conditions. Tier 3 involves site-specific pathway assessment by collecting more detailed site-specific information and conducting confirmatory sub-slab and or indoor air sampling. The vapor intrusion investigation to be conducted by

EWMA focuses on the site-specific pathway assessment outlined in Tier 3, based on the availability of preliminary information from previous investigations at the Quanta Site, and USEPA's requirement to a conduct vapor intrusion investigation.

Based upon the Tier 3 (site-specific) assessment as outlined in OSWER's guidance document, EWMA proposes the following steps as part of the vapor intrusion investigation:

- Building Inspection/survey and indoor chemical inventory to establish and/or remove any potential indoor sources of target VOCs in the building prior to air sampling;
- Direct measurement of foundation (i.e., sub-slab) air concentrations in order to determine the presence of a potential vapor source;
- Direct measurement of indoor air concentrations in order to determine the presence of target VOCs. The samples are to be collected in Summa[®] canisters; and
- Direct measurement of ambient (outside) air concentrations in order to identify any background sources of the target VOCs. The samples are to be collected in Summa[®] canisters.

All sub-slab, indoor air and ambient air samples will be submitted to a NJDEP-certified laboratory (STL Burlington, VT) for selected and target VOCs using USEPA Method TO-15.

The field and analytical methods are discussed in detail in the Vapor Intrusion Investigation Work Plan developed by EWMA dated April 2005 (Attachment A)

In order to evaluate the vapor intrusion potential and health risk, EWMA intends to compare the sub-slab and indoor air sampling data to the target shallow soil gas and target indoor air concentrations (for 10^{-5} cancer risk level and HI of 1.0 for non-cancer risk) provided in Table 2b (General Screening Levels and Summary Sheet) in the OSWER guidance. In addition, target indoor air concentrations will also be compared to the Risk Based Concentrations (RBCs) for ambient air established by the USEPA Region 3. These values are based on a 10^{-6} incremental individual lifetime cancer risk and will be used for comparison purposes only, in order to determine the potential long-term health risk. The interpretation of the comparisons will be performed in the context of the sub-slab air results, ambient (outside) air sampling results, and published background concentrations for indoor air for target VOCs to account for any background sources.

5.2.9 Floodplain Assessment

A delineation of the 100-year and 500-year floodplains will be conducted during the RI. If remedial activities will occur within either floodplain, a floodplain assessment will need to protect against the adverse effects of the 100-year and 500-year flooding event. If the site or areas potentially impacted by possible remediation are found to be within the 100-year or 500-year floodplains, a discussion of the effects of any proposed remedial alternative and their effects on the floodplain (including a comparison with non-selected alternatives and their effects on the on the floodplain), and measures possible to minimize potential adverse floodplain impacts, including a discussion of those that are being implemented to minimize the potential spread of contamination due to a flooding event during or after remedial action implementation will be included in the FS.

5.2.10 Subsurface Utility Field Survey

An underground utility field survey will be conducted at the Site to determine if the utilities onsite act as a conduit for contamination on and offsite. Using existing drawings and site observations, field personnel will attempt to locate all underground utilities and locate areas for additional investigation.

In addition, an underground storm sewer outflow on 115 River Road and the outflow for the Unilever property will be evaluated with regard to migration of contaminants from the Quanta Property. Maps showing the locations of these outflows will be obtained from respective property owners, if available.

5.3 INSTRUMENT SURVEY

A survey of all new permanent and temporary monitoring wells, soil borings, and other environmental sampling points at the Quanta Site will be conducted using traditional ground or global positioning system (GPS) survey methods. In addition, all existing monitoring wells will be identified and resurveyed. The locations of the points will be surveyed in the New Jersey State Plane Coordinate System relative to the North American Datum (NAD) of 1983. The monitoring wells will be surveyed relative to the North American Vertical Datum (NAVD) of 1988, and the vertical survey will be to the nearest one hundredth of a foot.

A New Jersey-licensed surveyor will provide horizontal and vertical control for the traditional ground survey mapping. Easements, rights-of-way, property lines, and property owner names will be included on the map. NJDEP Forms A and B will be completed.

All data submitted to the USEPA will be submitted in USEPA Region 2 EDD format. Including survey data in UTM Zone 18 NAD 83.

5.4 DATA VALIDATION REPORT

An independent USEPA CLP-certified and NJDEP-certified laboratory will conduct the chemical analyses. Parsons will validate the chemical results of the RI sampling in accordance with the Site QAPP (Appendix B). Validation procedures are discussed in the QAPP. In summary, the data validation will be performed using the guidelines set forth in the USEPA Region II CERCLA Data Validation Standard Operating Procedures (<http://www.epa.gov/region02/desa/hsw/sops.htm>), USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (USEPA, 1999), and USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (USEPA, 2002). The data validation will include an initial review to verify completeness of laboratory documentation, and a quality assurance review that will include assessment of relevant identified in the QAPP (Appendix B). Data qualifiers consistent with the USEPA Region II quality assurance guidance will be assigned as necessary to analytical results tabulated in data tables.

Validated analytical data will be submitted within 45 days of each sampling activity event (i.e., the initial proposed field investigation event). Results of the data validation will be summarized in an appendix to the RI report.

5.5 PRELIMINARY SITE CHARACTERIZATION REPORT

A Preliminary Site Characterization Report (PSCR) will be prepared after completing the field sampling and analysis. The report will review the investigation activities and describe and display the data from OU1. It will document the location and characteristics of subsurface features and contamination, including the affected medium, location, physical state, concentrations of contaminants and quantity. It will also document the location, dimensions, physical condition, and varying concentrations of each contaminant throughout each source and the extent of contaminant migration in the applicable medium. The PSCR will be submitted to USEPA within 30 days of validation of the final set of field data. Within 14 days after submittal of the PSCR, a presentation will be made to the USEPA and the State on the findings of the report. The PSCR will provide the USEPA with a basis for the development of the risk assessment, and evaluation of the development and screening of remedial alternatives, and identification and refinement of ARARs.

5.6 FATE AND TRANSPORT MODEL MEMORANDUM

A Fate and Transport Model Memorandum will be prepared as part of the RI.

5.7 HUMAN HEALTH RISK ASSESSMENT

A Baseline Human Health Risk Assessment (BHHRA) for the Quanta Site will be prepared and incorporated into the RI for OU1. The BHHRA will identify actual and potential cancer risks and non-cancer hazards to human health in accordance with CERCLA, the NCP, and USEPA guidance. During the development of the BHHRA, several intermediate documents will be prepared, as identified below.

A Memorandum on Exposure Scenarios and Assumptions based on the present and reasonably anticipated future land use of the Site will be completed within 45 days after approval of the RI/FS work plan. The memorandum will present the conceptual site model, exposure routes of concern, and contain identified pathways [Risk Assessment Guidelines for Superfund (RAGS) Part D Table 1]. The Memorandum will also include a discussion of exposure parameters for identified pathways (RAGS Part D Table 4) with reference to USEPA's 1991 Standard Default Assumptions and updated USEPA guidance.

Within 45 days after receipt of the last set of validated data, a Pathway Analysis Report (PAR) describing the baseline human health risk assessment process will be completed and submitted to USEPA. The PAR will be developed in accordance with the guidelines set forth in the RAGS Part D and other appropriate EPA guidelines. The PAR will identify Contaminants of Potential Concern (COPCs) (Table 2), media-specific exposure point concentrations (Table 3), and toxicological information (Tables 5 and 6) for identified COPCs. Completed RAGS Part D Tables 2, 3, 5, and 6 will be included in the PAR. The PAR must be reviewed and approved prior to submittal of the draft BHHRA.

Within 45 days of USEPA's approval of the PAR, a Draft BHHRA will be completed and included in the RI. The BHHRA will be performed to assess potential exposure and risk to human health associated with site soil, sediment, surface water, and groundwater. The BHHRA

will be conducted in accordance with CERCLA, the NCP, and USEPA guidance, using the approach and parameters described in the approved Memorandum of Exposure Scenarios and Assumptions and the PAR. The BHHRA will include the tables presented in the exposure scenario memorandum and the PAR, completed RAGS Part D Tables 7 through 10 summarizing cancer risk and non-cancer hazards, and appropriate text in the risk characterization describing the uncertainties and critical assumptions.

The BHHRA includes the following:

- Identification of and evaluation of the chemicals of potential concern detected in soil, groundwater, surface water, and sediments at the site utilizing all currently available media-specific analytical data generated during the RI.
- Exposure assessment – Identification of the potential receptors under the current and future scenarios and identify the potential complete exposure pathways for each potential receptors.
- Toxicity assessments – Discussion of toxicological properties of the chemicals of concern.
- Risk characterization – Calculation of the total cancer risk and total hazard index for each potential receptor.
- Uncertainty analysis – Identification of any uncertainties involved in the data collection, exposure assessment, toxicity assessment and risk characterization.

5.8 ECOLOGICAL RISK ASSESSMENT

An ecological risk assessment will be performed for the Quanta Site and incorporated into the RI for OU1. The initial assessment will consist of a Screening-Level Ecological Risk Assessment (SLERA), and if necessary a full Baseline Ecological Risk Assessment (BERA) will be prepared based on field activities that occur during the growing season (between May and September). However, the primary ecological study relative to impacts to the Hudson River will be incorporated in the OU2 RI.

Within 45 days after receipt of the last set of validated data, a SLERA will be completed in accordance with the current "Ecological Risk Assessment Guidance for Superfund, Process for Designing and Conducting Ecological Risk Assessments" (ERAGS), (USEPA, 1997). The SLERA will include a comparison of the maximum contaminant concentrations in each media of concern to appropriate conservative ecotoxicity screening values.

If a full Baseline Ecological Risk Assessment (BERA) is warranted related to any ecological considerations in the Upland Area, USEPA will provide written notification of this requirement. A Scope of Work outlining the steps and data necessary to perform the BERA will be drafted within 21 days after the receipt of USEPA's notification. The fieldwork for the BERA will be performed during the growing season (between May and September). A draft BERA will be submitted to USEPA for inclusion in the RI Report within 45 days of completion of the final set of BERA-related validated data. The draft BERA will be conducted to assess actual and potential ecological risks to the environment associated with the media identified in the SLERA.

USEPA Proposed Guidelines for Ecological Risk Assessment and other USEPA Guidance documents will be observed for the ecological risk assessment. The draft BERA report will address the following:

- Hazard Identification (sources). Available information on the hazardous substances present at the Site will be reviewed and the major contaminants of concern will be identified.
- Dose-Response Assessment. Contaminants of concern will be identified and selected based on their intrinsic toxicological properties.
- Characterization of Potential Receptors and Environmental Exposure Pathways.
- Chemicals, Indicator Species, and End Points Identification.
- Exposure Assessment. The magnitude of actual environmental exposures, the frequency and duration of these exposures, and the routes by which receptors are exposed will be evaluated. The exposure assessment will include an evaluation of the likelihood of such exposures occurring and will provide the basis for the development of acceptable exposure levels. Reasonable maximum estimates of exposure for both current land use conditions and potential land use conditions at the Site will be developed.
- Toxicity Assessment/Ecological Effects Assessment. The toxicity and ecological effects assessment will address the types of adverse environmental effects associated with chemical exposures, the relationships between magnitude of exposures and adverse effects, and the related uncertainties for contaminant toxicity.
- Risk Characterization. During risk characterization, chemical-specific toxicity information, combined with quantitative and qualitative information from the exposure assessment, will be compared to measured levels of contaminant exposure levels and the levels predicted through environmental fate and transport modeling. These comparisons will determine whether concentrations of contaminants at or near the Site are affecting or could potentially affect the environment.
- Identification of Limitations/Uncertainties. Critical assumptions and uncertainties will be addressed in the report.
- Site Conceptual Model. Based on contaminant identification, exposure assessment, toxicity assessment, and risk characterization, a conceptual model of the Site will be presented.

Appropriate soil screening values and toxicological benchmarks can be found in the USEPA's Draft Ecological Soil Screening Levels (SSLs), the Preliminary Remediation Goals for Ecological Endpoints (Efroymson et al. 1997), and the Toxicological Benchmarks for Wildlife: (Sample, B.E., et al. 1996 Revision). In addition, the USEPA has published the Generic Ecological Risk Assessment Endpoints (GEAE) for Ecological Risk Assessment, which describes a set of endpoints that can be considered and adapted for specific ecological risk assessment.

The draft BERA Report will be revised in response to USEPA comments and a final BERA report will be submitted

5.9 REMEDIAL INVESTIGATION REPORT

The RI report will present the characteristics of OU1, including contaminated media, extent of contamination, and the physical boundaries of contamination within the Upland Area. The RI will also summarize the results of the field activities, sources of contamination, and fate and transport of contaminants. Analytical data will be presented in tabular form in summary tables. Key findings will be presented on site maps. The RI Report will be written in accordance with the "Guidance for Conducting Remedial Investigations / Feasibility Studies under CERCLA," OSWER Directive 9355.3-01, October 1988, Interim Final (or latest revision), and Guidance for Data Usability in Risk Assessment," (EPA/540/G-90/008, September 1990 (or latest revision). The RI report will be divided into the following sections:

- Section 1 – Introduction, including purpose and background including relevant previous investigation results, and a summary of risk assessment results;
- Section 2 – Scope of Work, including data collection methods and deviations from the Work Plan;
- Section 3 – Physical Characteristics of the Site including surface features, hydrology, geology, etc.;
- Section 4 – Nature and Extent of Impacts, including potential sources, analytical results including tabular summary data table with applicable standards, criteria, or guidance values (NJDEP Soil Cleanup Criteria, NJDEP Ground Water Quality Criteria, USEPA MCLs, etc.), and contamination assessment;
- Section 5 – Contaminant Fate and Transport, including potential routes of migration, persistence, and migration and preliminary identification of ARARs applicable to the various media of concern; and
- Section 6 – Summary, Conclusions, and Recommendations.

All data submitted to the USEPA will be submitted in USEPA Region 2 EDD format. Including survey data in UTM Zone 18 NAD 83. The sample EDD format is located at <http://www.epa.gov/region02/superfund/medd.htm>.

Draft and Final RI Reports will be prepared for distribution to the USEPA. The final RI Report will include amendments that are responsive to the directions provided in USEPA comments on the Draft RI.

TABLES

Table 5-1 Proposed Soil Borings, Monitoring Wells, and Sampling in OU1

Table 5-1
Proposed Soil Borings, Monitoring Wells, and Sampling in OU1
Quanta Resources Site
Edgewater, New Jersey

	Location ID	Rationale	Property	Soil Sampling Depths for Laboratory Analyses (ft bgs)	Soil Sampling Laboratory Analyses	Well Screened Interval	Hydrostratigraphic Unit	Approximate Total Depth of Well (feet)	Ground Water Sampling Laboratory Analyses
Monitoring Wells									
1	MW-101DS	To investigate the deep sand layer in the upgradient area of the Site.	Quanta	0-2', WT, TBD based on field screening, 2 ft into the C/S, Deep Sand	VOCs, SVOCs, PCBs, Pesticides (excluding deep sand), arsenic, total chromium (2 sample per boring), hex. chromium, lead, ammonia (excluding deep sand), Grain size @ WT	Confined TBD	Sand below the bottom of C/S confining unit	TBD	VOCs, SVOCs, PCBs, arsenic, lead
2	MW-102A	To investigate if LNAPL is present near an apparent source for BTEX, SVOCs, and PAHs.	Quanta	None Proposed	None	Unconfined (SWT) 3-13	Fill, Sand/ Silty Sand	13	VOCs, SVOCs, PCBs, arsenic, lead
3	MW-102B	To investigate if DNAPL is present near an apparent source area for BTEX, SVOCs and PAHs.	Quanta	0-2', WT, TBD based on field screening, 2 ft into the C/S	VOCs, SVOCs, PCBs, arsenic, total chromium (1 sample per boring), hex. chromium, lead Grain size @ WT	Unconfined (BWT) 18-28	Fill, Sand / Silty Sand	30	VOCs, SVOCs, PCBs, arsenic, lead
4	MW-103A	To delineate the water table concentrations of dissolved plumes on the Quanta property, downgradient of an apparent source area (i.e., MW-102) and assess presence of free LNAPL.	Quanta	None Proposed	None	Unconfined (SWT) 3-13	Fill, Sand / Silty Sand	13	VOCs, SVOCs, PCBs, Pesticides, arsenic, lead
5	MW-103DS	To determine the concentrations of VOCs, SVOCs, PAHs, and inorganics below the confining unit.	Quanta	0-2', WT, TBD based on field screening, 2 ft into the C/S, Deep sand	VOCs, SVOCs, PCBs, Pesticides (excluding deep sand), arsenic, total chromium (2 sample per boring), hex. chromium, lead, Grain size @ WT	Confined TBD	Sand below the bottom of C/S confining unit	TBD	VOCs, SVOCs, PCBs, arsenic, lead
6	MW-105A	To delineate the water table concentrations of dissolved plumes on the Quanta property near the Hudson River and assess presence of free LNAPL.	Quanta	0-2', WT, TBD based on field screening, 2 ft into the C/S	VOCs, SVOCs, PCBs, arsenic, total chromium (1 sample per boring), hex. chromium, lead, Grain size @ WT Atterberg Limit	Unconfined (SWT) 3-13	Fill, Sand / Silty Sand	13	VOCs, SVOCs, PCBs, arsenic, lead
7	MW-106A	To delineate the water table concentrations of dissolved plumes on the Unilever property and assess presence of free LNAPL.	Unilever Research	0-2', WT, TBD based on field screening	VOCs, SVOCs, PCBs, arsenic, total chromium (1 sample per boring), hex. chromium, lead, Grain size @ WT	Unconfined (SWT) 3-13	Fill, Sand / Silty Sand	13	VOCs, SVOCs, PCBs, arsenic, lead
8	MW-107A	To delineate the water table concentrations of dissolved plumes on the Unilever property and assess presence of free LNAPL.	Unilever Research	None proposed	None	Unconfined (SWT) 3-13	Fill, Sand / Silty Sand	TBD	VOCs, SVOCs, PCBs, arsenic, lead
9	MW-107DS	To determine the concentrations of VOCs, SVOCs, PAHs, and inorganics below the confining unit.	Unilever Research	0-2', WT, TBD based on field screening, 2 ft into the C/S, Deep Sand	VOCs, SVOCs, PCBs, arsenic, total chromium (2 sample per boring), hex. chromium, lead, Grain size @ WT	Confined TBD	Sand below the bottom of C/S confining unit	TBD	VOCs, SVOCs, PCBs, arsenic, lead

	Location ID	Rationale	Property	Soil Sampling Depths for Laboratory Analyses (ft bgs)	Soil Sampling Laboratory Analyses	Well Screened Interval	Hydrostratigraphic Unit	Approximate Total Depth of Well (feet)	Ground Water Sampling Laboratory Analyses
10	MW-109A	To delineate the water table concentrations of dissolved plumes on the Unilever property and assess presence of free LNAPL.	Unilever Research	0-2', WT, TBD based on field screening, 2 ft into the C/S	VOCs, SVOCs, PCBs, arsenic, total chromium (1 sample per boring), hex. chromium, lead Grain size @ WT	Unconfined (SWT) 3-13	Fill, Sand / Silty Sand	13	VOCs, SVOCs, PCBs, arsenic, lead
11	MW-111A	To delineate the water table concentrations of dissolved plumes and assess presence of free LNAPL	3YLLC	None	None	Unconfined (SWT) TBD	Fill, Sand / Silty Sand; top of screen across water table.	TBD	VOCs, SVOCs, PCBs, Pesticides, arsenic, lead, ammonia
12	MW-111B	To determine upgradient concentrations of VOCs, SVOCs, PAHs, PCBs, Pesticides, and inorganics in the upper ground water zone.	3Y LLC	0-2', WT, TBD based on field screening, 2 ft into the C/S	VOCs, SVOCs, PCBs, Pesticides, arsenic, total chromium (1 sample per boring), hex. chromium, lead, ammonia, Grain size @ WT	Unconfined (SWT) TBD	Fill, Sand / Silty Sand; bottom set at top of C/S confining unit.	TBD	VOCs, SVOCs, PCBs, Pesticides, arsenic, lead, ammonia
13	MW-112A	To delineate the water table concentrations of dissolved plumes on the Quanta property and assess presence of free LNAPL. Will define source areas and determine if one to two plumes exist for BTEX and selected SVOCs and PAHs.	Quanta	None	None	Unconfined (SWT) TBD	Fill, Sand / Silty Sand; top of screen across water table	TBD	VOCs, SVOCs, PCBs, Pesticides, arsenic, and lead, ammonia
14	MW-112B	To delineate the concentrations of dissolved plumes on the Quanta property and assess presence of free DNAPL. Will define source areas and determine if one to two plumes exist for BTEX and selected SVOCs and PAHs.	Quanta	0-2', WT, TBD based on field screening, 2 ft into the C/S	VOCs, SVOCs, PCBs, Pesticides, arsenic, total chromium (1 sample per boring) hex. chromium, lead, ammonia, Grain size @ WT	Unconfined (SWT) TBD	Fill, Sand / Silty Sand; bottom set at top of C/S confining unit	TBD	VOCs, SVOCs, PCBs, Pesticides, arsenic, and lead, ammonia
15	MW-113A	To delineate the water table concentrations of dissolved plumes on the Quanta property and assess presence of free LNAPL. Will define source areas and determine if one to two plumes exist for BTEX and selected SVOCs and PAHs.	Quanta	None	None	Unconfined (SWT) TBD	Fill, Sand/ Silty Sand	TBD	VOCs, SVOCs, PCBs, Pesticides, arsenic, and lead
16	MW-113B	To delineate the concentrations of dissolved plumes on the Quanta property and assess presence of free DNAPL. Will define source areas and determine if one to two plumes exist for BTEX and selected SVOCs and PAHs.	Quanta	None	None	Unconfined (SWT) TBD	Fill, Sand / Silty Sand; top of screen across water table and bottom set at top of C/S confining unit	TBD	VOCs, SVOCs, PCBs, Pesticides, arsenic, and lead
17	MW-113DS	To delineate the concentrations of dissolved plumes on the Quanta property and assess presence of free DNAPL. Will define source areas and determine if one to two plumes exist for BTEX and selected SVOCs and PAHs.	Quanta	0-2', WT, TBD based on field screening, 2 ft into the C/S, Deep Sand	VOCs, SVOCs, PCBs, Pesticides (excluding deep sand), arsenic, total chromium (2 sample per boring), hex. chromium, lead, Grain size @ WT	Confined TBD	Sand below the bottom of C/S confining unit	TBD	VOCs, SVOCs, PCBs, arsenic, lead

	Location ID	Rationale	Property	Soil Sampling Depths for Laboratory Analyses (ft bgs)	Soil Sampling Laboratory Analyses	Well Screened Interval	Hydrostratigraphic Unit	Approximate Total Depth of Well (feet)	Ground Water Sampling Laboratory Analyses
18	MW-114A	To delineate the water table concentrations of dissolved plumes on the Spencer Kellogg property and assess presence of free LNAPL. Will define source areas and determine if one to two plumes exist for BTEX and selected SVOCs and PAHs.	Spencer Kellogg	None	None	Unconfined (SWT) TBD	Fill, Sand / Silty Sand; top of screen across water table	TBD	VOCs, SVOCs, PCBs, arsenic, lead
19	MW-114B	To delineate the concentrations of dissolved plumes on the Spencer Kellogg property and assess presence of free DNAPL. Will define source areas and determine if one to two plumes exist for BTEX and selected SVOCs and PAHs.	Spencer Kellogg	0-2', WT, TBD based on field screening, 2 ft into the C/S	VOCs, SVOCs, PCBs, arsenic, total chromium (1 sample per boring), hex. chromium, lead Grain size @ WT	Unconfined (SWT) TBD	Fill, Sand / Silty Sand; bottom set at top of C/S confining unit	TBD	VOCs, SVOCs, PCBs, arsenic, lead
20	MW-115A	To delineate the southern extent of water table concentrations of dissolved plumes on the Unilever property and assess presence of free LNAPL.	Unilever Research	None	None	Unconfined (SWT) TBD	Fill, Sand / Silty Sand; top of screen across water table	TBD	VOCs, SVOCs, PCBs, arsenic, lead
21	MW-115B	To delineate the southern extent of water table concentrations of dissolved plumes on the Unilever property and assess presence of free DNAPL.	Unilever Research	0-2', WT, TBD based on field screening, 2 ft into the C/S	VOCs, SVOCs, PCBs, arsenic, total chromium (1 sample per boring), hex. chromium, lead Grain size @ WT	Unconfined (SWT) TBD	Fill, Sand / Silty Sand; bottom set at top of C/S confining unit	TBD	VOCs, SVOCs, PCBs, arsenic, lead
22	MW-116A	To delineate the water table concentrations of dissolved plumes on the Quanta property and assess presence of free LNAPL.	Quanta	None	None	Unconfined (SWT) TBD	Fill, Sand / Silty Sand; top of screen across water table	TBD	VOCs, SVOCs, PCBs, arsenic, lead
23	MW-116B	To delineate the concentrations of dissolved plumes on the Quanta property and assess presence of free DNAPL.	Quanta	0-2', WT, TBD based on field screening, 2 ft into the C/S	VOCs, SVOCs, PCBs, arsenic, total chromium (1 sample per boring) hex. chromium, lead Grain size @ WT Atterberg Limits	Unconfined (SWT) TBD	Fill, Sand / Silty Sand; bottom set at top of C/S confining unit	TBD	VOCs, SVOCs, PCBs, arsenic, lead
24	MW-116DS	To determine the concentrations of VOCs, SVOCs, PAHs, and inorganics below the confining unit.	Quanta	None proposed	None	Confined TBD	Sand below the bottom of C/S confining unit	TBD	VOCs, SVOCs, PCBs, arsenic, lead
25	MW-117A	To delineate the water table concentrations of dissolved plumes on the Quanta property and assess presence of free LNAPL.	Quanta	None Proposed	None	Unconfined (SWT) TBD	Fill, Sand / Silty Sand; top of screen across water table	TBD	VOCs, SVOCs, PCBs, Pesticides, arsenic, and lead
26	MW-117B	To delineate the concentrations of dissolved plumes on the Quanta property and assess presence of free DNAPL.	Quanta	0-2', WT, TBD based on field screening, 2 ft into the C/S	VOCs, SVOCs, PCBs, Pesticides, arsenic, total chromium (1 sample per boring), hex. chromium, lead Grain size @ WT Atterberg Limits	Unconfined (SWT) TBD	Fill, Sand / Silty Sand; bottom set at top of C/S confining unit	TBD	VOCs, SVOCs, PCBs, Pesticides, arsenic, and lead
27	MW-118A	To delineate the water table concentrations of dissolved plumes on the Quanta property and assess presence of free LNAPL.	Quanta	None Proposed	None	Unconfined (SWT) TBD	Fill, Sand / Silty Sand; top of screen across water table	TBD	VOCs, SVOCs, PCBs, arsenic, lead

	Location ID	Rationale	Property	Soil Sampling Depths for Laboratory Analyses (ft bgs)	Soil Sampling Laboratory Analyses	Well Screened Interval	Hydrostratigraphic Unit	Approximate Total Depth of Well (feet)	Ground Water Sampling Laboratory Analyses
28	MW-118B	To delineate the concentrations of dissolved plumes on the Quanta property and assess presence of free DNAPL.	Quanta	0-2', WT, TBD based on field screening, 2 ft into the C/S	VOCs, SVOCs, PCBs, arsenic, total chromium (1 sample per boring), hex. chromium, lead Grain size @ WT Atterberg Limits	Unconfined (SWT) TBD	Fill, Sand / Silty Sand; bottom set at top of C/S confining unit	TBD	VOCs, SVOCs, PCBs, arsenic, lead
29	MW-119A	To delineate the water table concentrations of dissolved plumes on the Spencer Kellogg property and assess presence of free LNAPL.	Spencer Kellogg	None Proposed	None	Unconfined (SWT) TBD	Fill, Sand / Silty Sand; top of screen across water table	TBD	VOCs, SVOCs, PCBs, arsenic, lead
30	MW-119B	To delineate the concentrations of dissolved plumes on the Spencer Kellogg property and assess presence of free DNAPL.	Spencer Kellogg	0-2', WT, TBD based on field screening, 2 ft into the C/S	VOCs, SVOCs, PCBs, arsenic, total chromium (1 sample per boring) hex. chromium, lead Grain size @ WT Atterberg Limits	Unconfined (SWT) TBD	Fill, Sand / Silty Sand; bottom set at top of C/S confining unit	TBD	VOCs, SVOCs, PCBs, arsenic, lead
31	MW-120A	To delineate the water table concentrations of dissolved plumes on the Spencer Kellogg property and assess presence of free LNAPL.	Spencer Kellogg	None Proposed	None	Unconfined (SWT) TBD	Fill, Sand / Silty Sand; top of screen across water table	TBD	VOCs, SVOCs, PCBs, arsenic, lead
32	MW-120B	To delineate the concentrations of dissolved plumes on the Spencer Kellogg property and assess presence of free DNAPL.	Spencer Kellogg	0-2', WT, TBD based on field screening, 2 ft into the C/S	VOCs, SVOCs, PCBs, arsenic, total chromium (1 sample per boring) hex. chromium, lead Grain size @ WT Atterberg Limits	Unconfined (SWT) TBD	Fill, Sand / Silty Sand; bottom set at top of C/S confining unit	TBD	VOCs, SVOCs, PCBs, arsenic, lead
33	MW-121A	To delineate the water table concentrations of dissolved plumes on the Spencer Kellogg property and assess presence of free LNAPL.	Spencer Kellogg	None Proposed	None	Unconfined (SWT) TBD	Fill, Sand / Silty Sand; top of screen across water table	TBD	VOCs, SVOCs, PCBs, arsenic, lead
34	MW-121B	To delineate the concentrations of dissolved plumes on the Spencer Kellogg property and assess presence of free DNAPL.	Spencer Kellogg	0-2', WT, TBD based on field screening, 2 ft into the C/S	VOCs, SVOCs, PCBs, arsenic, total chromium (1 sample per boring), hex. chromium, lead Grain size @ WT	Unconfined (SWT) TBD	Fill, Sand / Silty Sand; bottom set at top of C/S confining unit	TBD	VOCs, SVOCs, PCBs, arsenic, lead
Existing Monitoring Wells									
1	MW-101A	Existing Monitoring Well	Quanta (Hotel Site)	NA	NA	Unconfined	Fill, Sand/Silty Sand, and confining unit		VOCs, SVOCs, PCB, Pesticides, arsenic, lead, ammonia
2	MW-102	Existing Monitoring Well	Quanta (Hotel Site)	NA	NA	Unconfined	Fill, Sand/Silty Sand, and confining unit		VOCs, SVOCs, PCB, arsenic, lead
3	MW-103	Existing Monitoring Well	Quanta (Hotel Site)	NA	NA	Unconfined	Fill, Sand/Silty Sand, and confining unit		VOCs, SVOCs, PCB, Pesticides, arsenic, lead
4	MW-105	Existing Monitoring Well	Quanta (Hotel Site)	NA	NA	Unconfined	Fill, Sand/Silty Sand, and confining unit		VOCs, SVOCs, PCB, arsenic, lead

	Location ID	Rationale	Property	Soil Sampling Depths for Laboratory Analyses (ft bgs)	Soil Sampling Laboratory Analyses	Well Screened Interval	Hydrostratigraphic Unit	Approximate Total Depth of Well (feet)	Ground Water Sampling Laboratory Analyses
5	MW-106	Existing Monitoring Well	Unilever	NA	NA	Unconfined	Fill, Sand/Silty Sand, and confining unit		VOCs, SVOCs, PCB, arsenic, lead
6	MW-107	Existing Monitoring Well	Unilever	NA	NA	Unconfined	Fill, Sand/Silty Sand, and confining unit		VOCs, SVOCs, PCB, arsenic, lead
7	MW-108	Existing Monitoring Well	Spencer Kellogg	NA	NA	Unconfined	Fill, Sand/Silty Sand, and confining unit		VOCs, SVOCs, PCB, arsenic, lead
8	MW-109	Existing Monitoring Well	Unilever	NA	NA	Unconfined	Fill, Sand/Silty Sand, and confining unit		VOCs, SVOCs, PCB, arsenic, lead
9	MW-A-1	Existing Monitoring Well	Celotex	NA	NA	Unconfined	Fill, Sand/Silty Sand, and confining unit		VOCs, SVOCs, PCB, arsenic, lead
10	MW-A-2	Existing Monitoring Well	Celotex	NA	NA	Unconfined	Fill, Sand/Silty Sand, and confining unit		VOCs, SVOCs, PCB, arsenic, lead, ammonia
11	MW-B	Existing Monitoring Well	Celotex	NA	NA	Unconfined	Fill, Sand/Silty Sand, and confining unit		VOCs, SVOCs, PCB, arsenic, lead
12	MW-C	Existing Monitoring Well	Celotex	NA	NA	Unconfined	Fill, Sand/Silty Sand, and confining unit		VOCs, SVOCs, PCB, arsenic, lead
13	MW-D	Existing Monitoring Well	Celotex	NA	NA	Unconfined	Fill, Sand/Silty Sand, and confining unit		VOCs, SVOCs, PCB, arsenic, lead
14	MW-F	Existing Monitoring Well	Celotex	NA	NA	Unconfined	Fill, Sand/Silty Sand, and confining unit		VOCs, SVOCs, PCB, arsenic, lead
15	MW-G	Existing Monitoring Well	Celotex	NA	NA	Unconfined	Fill, Sand/Silty Sand, and confining unit		VOCs, SVOCs, PCB, arsenic, lead
16	MW-I	Existing Monitoring Well	Celotex	NA	NA	Unconfined	Fill, Sand/Silty Sand, and confining unit		VOCs, SVOCs, PCB, arsenic, lead
17	MW-J	Existing Monitoring Well	Celotex	NA	NA	Unconfined	Fill, Sand/Silty Sand, and confining unit		VOCs, SVOCs, PCB, arsenic, lead

	Location ID	Rationale	Property	Soil Sampling Depths for Laboratory Analyses (ft bgs)	Soil Sampling Laboratory Analyses	Well Screened Interval	Hydrostratigraphic Unit	Approximate Total Depth of Well (feet)	Ground Water Sampling Laboratory Analyses
18	MW-L	Existing Monitoring Well	Celotex	NA	NA	Unconfined	Fill, Sand/Silty Sand, and confining unit		VOCs, SVOCs, PCB, arsenic, lead, ammonia
Soil Borings									
1	SB-1	For soil characterization and to determine the presence or absence of NAPL in the subsurface.	Spencer Kellogg	0-2', WT, and TBD based on field screening; clay silt	VOCs, SVOCs, PCBs, arsenic, total chromium (1 sample per boring), hex. chromium, lead Grain size @ WT	None	Fill, Sand / Silty Sand, and confining unit	NA	None
2	SB-2	For soil characterization and to determine the presence or absence of NAPL in the subsurface.	Quanta	0-2', WT, and TBD based on field screening; clay silt	VOCs, SVOCs, PCBs, arsenic, total chromium (1 sample per boring), hex. chromium, lead Grain size @ WT	None	Fill, Sand / Silty Sand, and confining unit	NA	None
3	SB-3	For soil characterization and to determine the presence or absence of NAPL in the subsurface.	Quanta	0-2', WT, and TBD based on field screening; clay silt	VOCs, SVOCs, PCBs, arsenic, total chromium (1 sample per boring), hex. chromium, lead Grain size @ WT	None	Fill, Sand / Silty Sand, and confining unit	NA	None
4	SB-4	For soil characterization and to determine the presence or absence of NAPL in the subsurface.	Spencer Kellogg	0-2', WT, TBD based on field screening, 2 ft into the C/S	VOCs, SVOCs, PCBs, arsenic, total chromium (1 sample per boring), hex. chromium, lead Grain size @ WT	None	Fill, Sand / Silty Sand, and confining unit	NA	None
5	SB-5	For soil characterization and to determine the presence or absence of NAPL in the subsurface.	Quanta	0-2', WT, TBD based on field screening, 2 ft into the C/S	VOCs, SVOCs, PCBs, arsenic, total chromium (1 sample per boring), hex. chromium, lead Grain size @ WT	None	Fill, Sand / Silty Sand, and confining unit	NA	None
6	SB-6	For soil characterization and to determine the presence or absence of NAPL in the subsurface.	Quanta	0-2', WT, and TBD based on field screening; clay silt	VOCs, SVOCs, PCBs, arsenic, total chromium (1 sample per boring), hex. chromium, lead Grain size @ WT	None	Fill, Sand / Silty Sand, and confining unit	NA	None
7	SB-7	For soil characterization and to determine the presence or absence of NAPL in the subsurface.	Quanta	0-2', WT, and TBD based on field screening; clay silt	VOCs, SVOCs, PCBs, arsenic, total chromium (1 sample per boring), hex. chromium, lead Grain size @ WT	None	Fill, Sand / Silty Sand, and confining unit	NA	None
8	SB-8	For soil characterization and to determine the presence or absence of NAPL in the subsurface.	Spencer Kellogg	0-2', WT, and TBD based on field screening; clay silt	VOCs, SVOCs, PCBs, arsenic, total chromium (1 sample per boring), hex. chromium, lead Grain size @ WT	None	Fill, Sand / Silty Sand, and confining unit	NA	None
9	SB-9	For soil characterization and to determine the presence or absence of NAPL in the subsurface.	Quanta	0-2', WT, and TBD based on field screening; clay silt	VOCs, SVOCs, PCBs, arsenic, total chromium (1 sample per boring), hex. chromium, lead Grain size @ WT	None	Fill, Sand / Silty Sand, and confining unit	NA	None

	Location ID	Rationale	Property	Soil Sampling Depths for Laboratory Analyses (ft bgs)	Soil Sampling Laboratory Analyses	Well Screened Interval	Hydrostratigraphic Unit	Approximate Total Depth of Well (feet)	Ground Water Sampling Laboratory Analyses
10	SB-10	To address contamination associated with two former 1,000-Gallon Gasoline USTs.	Quanta (Hotel Site)	0-2', WT, and TBD based on field screening; clay silt	VOCs, SVOCs, PCBs, TAL Metals, hex. chromium, Grain size @ WT	None	Fill, Sand / Silty Sand, and confining unit	NA	None
11	SB-11	To investigate potential source (1,000-Gallon Gasoline USTs).	Quanta (Hotel Site)	0-2', WT, and TBD based on field screening; clay silt	VOCs, SVOCs, PCBs, TAL Metals, hex. chromium,, Grain size @ WT	None	Fill, Sand / Silty Sand, and confining unit	NA	None
12	SB-12	To address contamination associated with two former 1,000-Gallon Gasoline USTs.	Quanta (Hotel Site)	0-2', WT, and TBD based on field screening; clay silt	VOCs, SVOCs, PCBs, TAL Metals, hex. chromium, ammonia, Grain size @ WT	None	Fill, Sand / Silty Sand, and confining unit	NA	None
13	SB-13	To address contamination associated with two former 1,000-Gallon Gasoline USTs.	Quanta (Hotel Site)	0-2', WT, and TBD based on field screening; clay silt	VOCs, SVOCs, PCBs, TAL Metals, hex. chromium, ammonia, Grain size @ WT	None	Fill, Sand / Silty Sand, and confining unit	NA	None
14	SB-14	To address contamination associated with two former 1,000-Gallon Gasoline USTs.	Quanta (Hotel Site)	0-2', WT, and TBD based on field screening; clay silt	VOCs, SVOCs, PCBs, arsenic, total chromium (1 sample per boring), hex. chromium, lead, ammonia, Grain size @ WT	None	Fill, Sand / Silty Sand, and confining unit	NA	None
15	SB-15	For soil characterization west of River Road.	City of Edgewater	0-2', WT, and TBD based on field screening; clay silt	VOCs, SVOCs, PCBs, TAL Metals, hex. chromium, ammonia, Grain size @ WT	None	Fill, Sand/Silty Sand, and confining unit	NA	None
16	SB-16	To assess arsenic at MW-107.	Unilever	0-2', WT, and TBD based on field screening; clay silt	VOCs, SVOCs, PCBs, arsenic, total chromium (1 sample per boring), hex. chromium, lead Grain size @ WT	None	Fill, Sand/Silty Sand, and confining unit	NA	None
17	SB-17	To assess arsenic at MW-107.	Spencer Kellogg	0-2', WT, and TBD based on field screening; clay silt	VOCs, SVOCs, PCBs, arsenic, total chromium (1 sample per boring) hex. chromium, lead Grain size @ WT	None	Fill, Sand/Silty Sand, and confining unit	NA	None
18	SB-18	To assess arsenic at MW-107.	Unilever	0-2', WT, and TBD based on field screening; clay silt	VOCs, SVOCs, PCBs, arsenic, total chromium (1 sample per boring), hex. chromium, lead Grain size @ WT	None	Fill, Sand/Silty Sand, and confining unit	NA	None

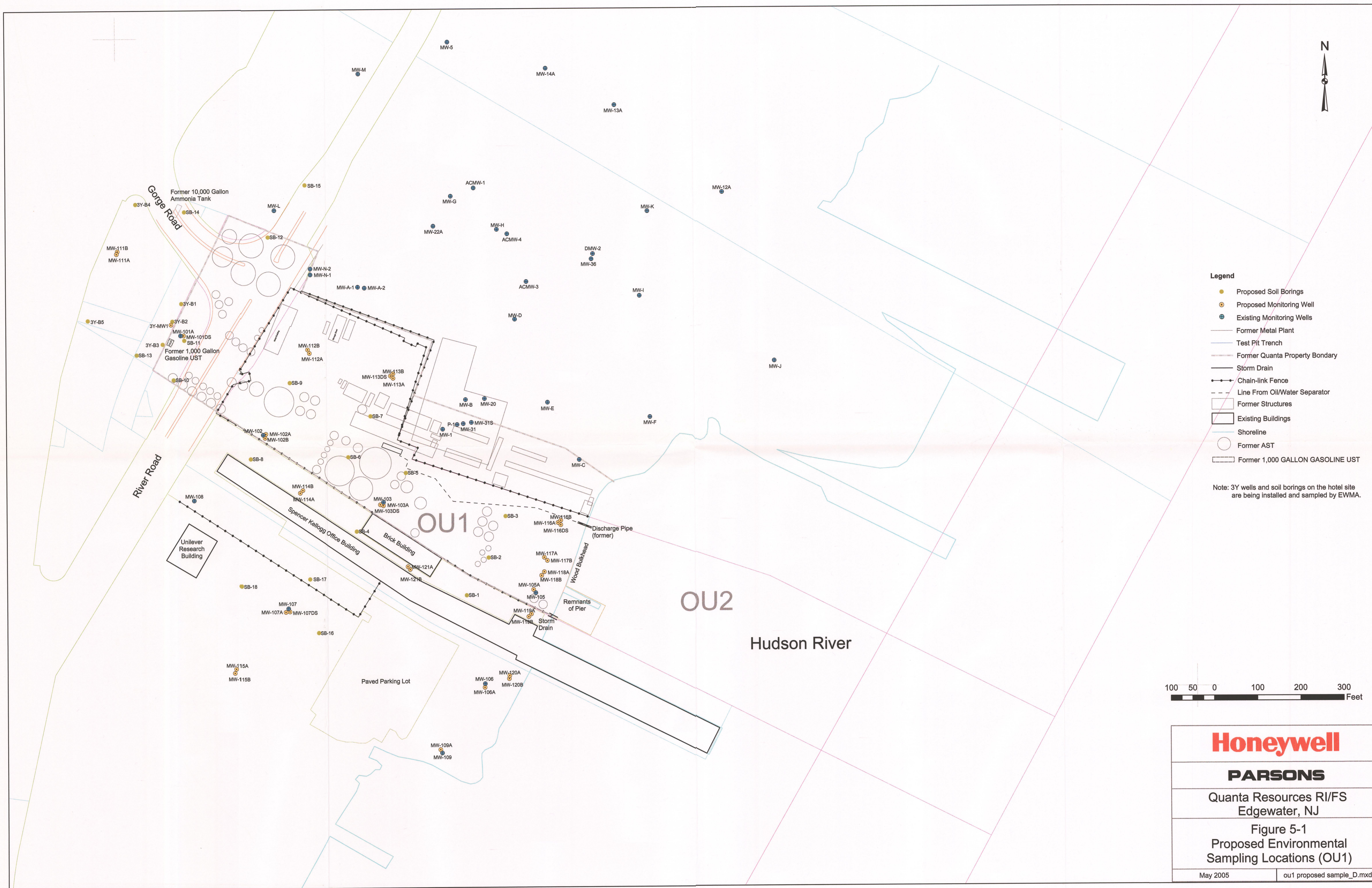
Notes:

- 1) SWT = Shallow water table
- 2) BTW = Bellow water table
- 3) C/S = Clay/silt (confining unit)
- 4) NA = Not Applicable
- 5) TBD = To be determined
- 6) WT = Water Table
- 7) 0-2' sample interval will be used for Human Health and Ecological Risk Assessment (per October 28, 2004 meeting with USEPA).
- 8) Total Chromium will be sampled from one unsaturated zone soil sample in each well and the deep sand soil sample in designated wells.

FIGURES

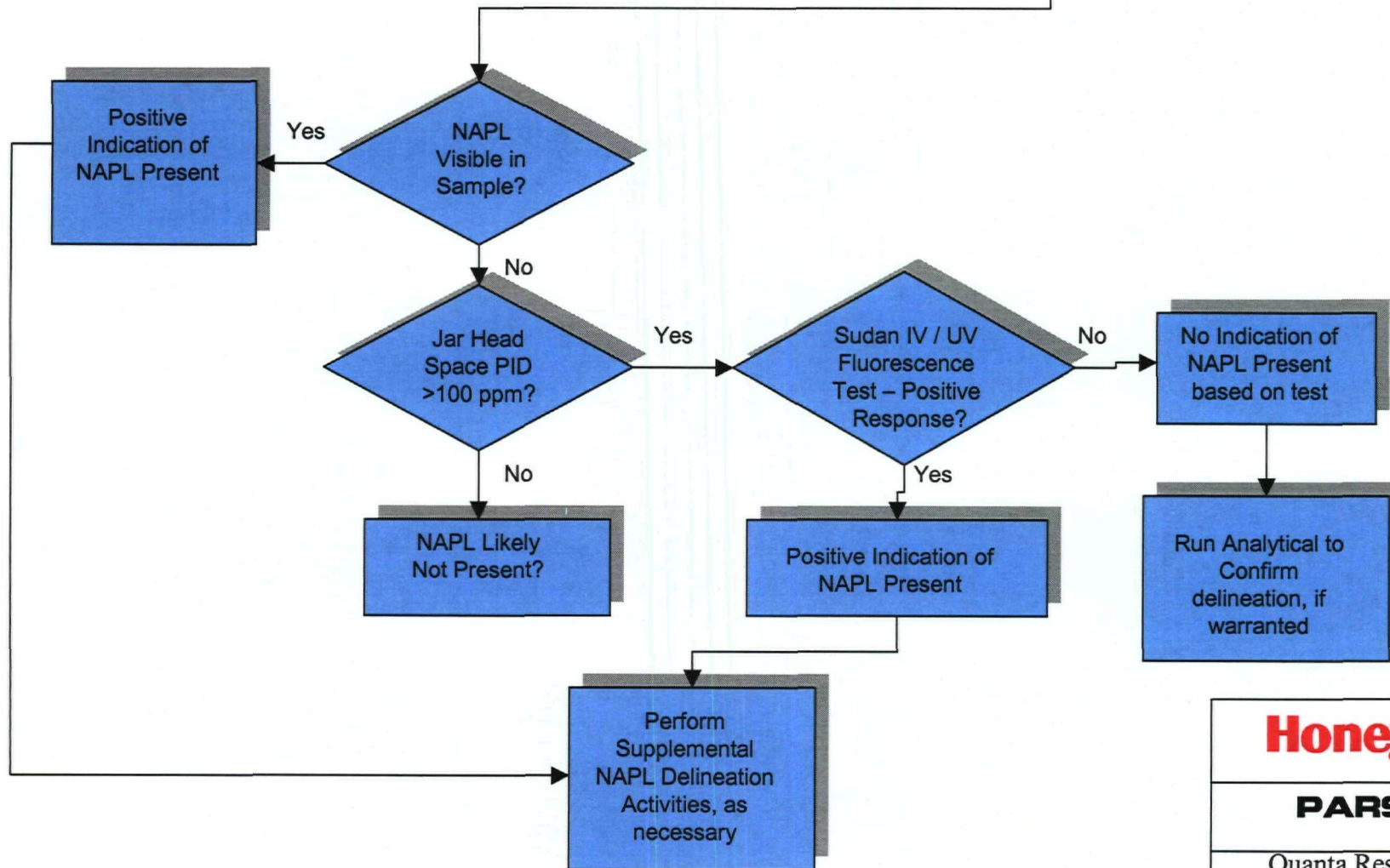
Figure 5-1 Proposed Environmental Sampling Locations (OU1)

Figure 5-2 NAPL Characterization Flow Chart



Soil/Sediment Characterization:
Soil Borings, Test Pits, Sediment Borings

Field Observations:
Descriptions, Visual Observations, Instrument Test (PID)



Honeywell

PARSONS

Quanta Resources RI/FS
Edgewater, NJ

Figure 5-2
NAPL Characterization
Flow Chart

SECTION 6

FEASIBILITY STUDY SCOPE

This section describes the overall approach for conducting the feasibility study at OU1 (Upland Area).

6.1 IDENTIFICATION OF CANDIDATE TECHNOLOGIES

An Identification of Candidate Technologies Memorandum will be prepared and submitted to USEPA within 30 days of the submission of the last set of validated analytical results to USEPA. The Memorandum will include a listing of candidate technologies required for alternative analysis, and will include innovative treatment technologies (as defined in the RI/FS Guidance) where appropriate. The Identification of Candidate Technologies Memorandum will be revised based on USEPA comment.

6.2 TREATABILITY STUDIES; AS NECESSARY

At the USEPA's request, treatability testing will be performed to assist in the detailed analysis of the alternatives. The testing results may be used in the detailed design of the selected remedial alternative. The treatability study activities will include the items described below.

Literature Survey and Determine Need for Treatability Testing – A literature survey will be conducted to gather information on performance, relative costs, applicability, removal efficiency, operations and maintenance requirements, and implementability of candidate technologies. If practical candidate technologies cannot be sufficiently demonstrated, or cannot be adequately evaluated, treatability testing will be conducted. If USEPA determines that treatability testing is required, and it cannot be demonstrated that treatability testing is not needed, a statement of work outlining the steps and required data will be prepared and submitted to USEPA.

Evaluate Treatability Studies – A decision will be made on the type of treatability testing (e.g., bench vs. pilot testing) to use for the Site based on discussions with the USEPA. The decision to perform a pilot scale treatability testing should be made as early as possible, given the time constraints associated with obtaining the equipment and conducting the testing. A separate treatability testing work plan or an amendment to the original site work plan will be submitted for USEPA review and approval.

Treatability Testing and Deliverables – The deliverables that will be prepared if treatability testing is conducted include the following: treatability testing statement of work, a work plan, a sampling and analysis plan, a final treatability evaluation report, and if appropriate, a treatability study health and safety plan. The Treatability Testing Statement of Work will be submitted within 14 days of notification by USEPA that treatability testing is required.

Treatability Testing Work Plan – A Treatability Testing Work Plan and schedule will be submitted within 30 days of written USEPA approval of the Treatability Testing Statement of Work. The Treatability Testing Work Plan will be amended in response to directions in USEPA

comments. The Work Plan will describe the background of the Site, remedial technology(ies) to be tested, test objectives, experimental procedures, treatability conditions, measurement of performance, analytical methods, data management and analysis, health and safety, and residual waste management. The Data Quality Objectives for the treatability testing will also be documented.

Treatability Study QAPP – A separate or revised QAPP will be submitted within 30 days of identification by USEPA of the need for a separate or revised QAPP. If the original QAPP is not adequate for defining the activities to be performed during the treatability test, a separate treatability study QAPP, or revision to the original QAPP, will be prepared for EPA review and approval. The new QAPP will be revised based on USEPA comments.

Treatability Study Health and Safety Plan – A separate or revised HSP will be submitted within 30 days of identification by USEPA of the need for a separate or revised HSP. If the original HSP is not adequate for defining the activities to be performed during the treatability test, a separate treatability study HSP, or revision to the original HSP, will be prepared.

Treatability Study Evaluation Report – A treatability Evaluation Report will be prepared and submitted to USEPA within 30 days of completing the treatability testing. Following the completion of treatability testing, the testing results will be analyzed and interpreted and a report prepared. The report will evaluate each technology's effectiveness, implementability, cost, and actual results as compared with predicted results. The report will also evaluate full-scale application of the technology. The report may be part of the RI/FS or a separate deliverable. The Treatability Testing Report will be revised based on USEPA comments.

6.3 DEVELOPMENT AND SCREENING OF REMEDIAL ALTERNATIVES

Concurrent with the RI Site characterization, a range of appropriate remedial and waste management options that will at a minimum protect human health and the environment will be developed and evaluated. The development and screening of remedial alternatives will provide an appropriate range of waste management options that will be evaluated. The following activities will be performed during the development and screening of alternatives.

Identification of ARARs – This task includes the identification of applicable and relevant and appropriate requirements (ARARs). Federal and state criteria, advisories, guidance that are applicable to the various media of concern at the Site will be identified. Preliminary ARARs will likely be Federal and State drinking water maximum contaminants levels (MCLs) and USEPA Region 9 Soil Preliminary Remediation Goals (PRGs). New Jersey Soil Cleanup Criteria and New Jersey Ground Water Criteria are criteria that are to be considered. Action specific, chemical specific, and location specific ARARs will be determined once site-specific data is obtained and evaluated in the RI.

Establish Remedial Action Objectives – Remedial action objectives (RAOs) will be developed for the media found to be impacted, specifying the chemicals of concern, exposure pathways, receptors and remediation goals. These objectives will be based on contaminant specific cleanup criteria and ARARs. The guidance for cleanup criteria will include state and federal criteria. USEPA will be consulted during this phase of study for input concerning

cleanup objectives, and a meeting with USEPA will be held early in the FS to review RAOs and preliminary alternatives. The remedial action objectives described in the FS report will be based on site-specific considerations.

Develop General Response Actions – General response actions are described as those actions that will satisfy the remedial action objectives. For each medium of interest, these response actions may include actions such as containment, treatment, excavation, pumping, or other actions, or a combination of these. General response actions will be developed for all media of interest.

Identify Areas and Volumes of Media – Based on the results of the RI efforts and specific remedial action objectives, the areas requiring remedial action will be estimated. Areas or volumes of media to which the general response actions may apply will be identified. These areas or volumes will take into account requirements for protectiveness as identified in the remedial action objectives. The chemical and physical characterization of the Site will also be taken into consideration.

Assemble and Document Alternatives / Preliminary Screening – Selected representative technologies will be assembled into alternatives for each affected medium or operable unit. A summary of the assembled alternatives and their related action-specific ARARS will be prepared for inclusion in a technical memorandum. Selected alternative may be eliminated during preliminary screening process. The preliminary screening of the alternatives will consider both effectiveness and implementability. Effectiveness will include an evaluation of the action from the following perspectives:

- Ability to meet the ARARs and protect human health and the environment;
- Ability to significantly and permanently reduce contaminant toxicity, mobility or volume;
- Ability to provide a permanent solution or remedy and thereby limit operation and maintenance requirements;
- Technical reliability;
- Demonstrated performance; and
- Ability to comply with federal, state, and local laws and regulations.
- Implementability will include the following:
 - Constructability (technical and administrative feasibility);
 - Concerns for worker and public health and safety during construction;
 - The period of time for the alternative to become operational and effective; and
 - Availability of components or treatment facilities.

Innovative alternatives will be carried through this screening if these actions offer a potential for better treatment performance or implementability, fewer adverse impacts, or lower costs than demonstrated technologies.

Technical literature and information available from manufacturers about the performance, costs, applicability, and implementability of candidate technologies will be assessed. The need for treatability testing will be documented from the available literature and other information.

Development and Screening of Alternatives Presentation and Technical Memorandum – Within 30 days upon USEPA's request, a presentation to USEPA and the State will be made that identifies the remedial action objectives and summarizes the development and preliminary screening of remedial alternatives. In addition, a Development and Screening of Remedial Alternatives technical memorandum summarizing the work performed in and the results of the development and screening process, including an alternatives array summary.

Refine Alternatives – Any information required to more completely refine the alternatives that remain after preliminary screening and to allow evaluation of each alternative will be developed. The remedial alternatives will be refined to identify contaminant volume addressed by the proposed process, preliminary design calculations, process flow diagrams, sizing of key process components, preliminary site layouts, and knowledge of limitations, assumptions, and uncertainties concerning each alternative. PRGs for each chemical in each medium will be modified as necessary to incorporate any new disk assessment information presented in the baseline risk assessment report.

Conduct and Document Screening Evaluation of Each Alternative – A final screening of alternatives may be performed based on short and long-term aspects of effectiveness, implementability, and relative cost. If there are many alternatives available for detailed analysis, then final screening will be performed to narrow the list of potential remedial actions for the detailed alternatives evaluation effort

Detailed Analysis of Remedial Alternatives – A detailed analysis of the remedial alternatives to provide USEPA with the information needed to allow for the selection of a remedy for the Quanta Site. Individual alternatives will be evaluated against nine evaluation criteria. Cost estimates will also be prepared using conservative estimates of material quantities to treat based on available sample results. Cost estimates will be accurate to approximately plus or minus 30 to 50 percent. The detailed analysis of individual alternatives will include the following evaluation criteria:

- Overall Protection of human health and the environment
- Compliance with ARARs
- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, or volume
- Short-term impacts and effectiveness
- Implementability
- Cost
- State (or support agency) acceptance
- Community acceptance

In addition, a comparative analysis will be conducted to evaluate the relative performance of each alternative in relation to each specific evaluation criterion. This analysis is in contrast to the preceding analysis in which each alternative was analyzed independently without the consideration of interrelationships between alternatives. This comparative analysis will identify the advantages and disadvantages of each alternative relative to one another so that the key trade-offs to be evaluated by the decision maker can be identified.

A technical memorandum will be prepared that summarizes the results of the comparative analysis.

Select Recommended Remedy – Based on the detailed evaluation, and after a public comment process, a remedy will be selected by the USEPA that is protective of public health and the environment, meets the applicable or relevant and appropriate regulatory requirements and cleanup objectives that have been identified to the maximum extent practicable, is cost-effective, reflects consideration of the preference for treatment rather than disposal, and represents the best balance of all evaluation criteria and considerations acceptable.

6.4 FEASIBILITY STUDY REPORT

A FS report will be prepared that will summarize the site characterization data, document the recommendation(s) made, and describe all preceding FS tasks. The report will consist of a detailed analysis and a cost-effectiveness analysis, in accordance with the NCP, as well as the most recent guidance. The report will describe the remedial technologies and alternatives that were evaluated and the rationale for selection. The most feasible alternative, along with its projected cost and regulatory impact will be identified. The FS report will be prepared in accordance with "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA" (USEPA, October 1988). The FS report will contain the following sections listed below:

Section 1 Introduction - Includes site background and project objectives, including a description of the field activities carried out as part of the site investigation, site characteristics such as geology, hydrogeology, meteorology, surface features, the nature and extent of contamination, and contaminant fate and transport;

Section 2 Identification and Screening of Technologies - This section will summarize the feasibility study and remedial objectives, and ARARs along with the technology screening;

Section 3 Development and Screening of Alternatives – This section will identify general response actions and describe screening of the remedial technologies considered for the Site. It will also present a description of the remedial alternatives;

Section 4 Detailed Analysis and Ranking of Alternatives - The alternatives are analyzed and ranked; and

Section 5 Recommended Remedy.

A Draft FS Report will be submitted to USEPA for review within 30 days of USEPA acceptance of the presentation that identifies the remedial action objectives and summarizes the development and preliminary screening of remedial alternatives.

Within 14 days of submitting the Draft FS Report, a presentation summarizing the finding of the Draft FS report will be made to the USEPA and the State.

A Draft Final FS Report will be prepared based on USEPA's comments. The Draft Final FS Report will be submitted to USEPA and made available to the public for review. A written response to comments, addressing USEPA and public comments on the Draft FS Report, will be prepared.

After the public comment period on the Proposed Plan has been completed, if a revision to the Draft Final FS Report is required, the Final FS Report will incorporate the comments from USEPA and the public. The USEPA will be responsible for the selection of the final remedial alternative.

SECTION 7

PROJECT ORGANIZATION

Several organizations will be involved directly in the performance and review of this project. These organizations have specific project functions and relate to each other in various ways according to their project responsibilities. The purpose of this section is to provide an understanding of the overall project organization and the function and responsibility of various groups to aid in the exchange of information and to ensure efficient project operation.

Honeywell is in the process of changing its vendor pool to perform the Quanta RI/FS work. Therefore, Honeywell will be sending an updated list of staff to replace the Parsons personnel noted in Section 7.3 and on Table 7-1 of this RI/FS Work Plan.

The key organizations and their responsibilities are described below and shown in Table 7-1.

7.1 ENVIRONMENTAL PROTECTION AGENCY

Honeywell and the Quanta Site Administrative Group (QSAG) have entered into an Administrative Order on Consent with the EPA to conduct a remedial investigation of OU1 at the Quanta Site. The USEPA will review and approve the RI/FS Work Plan, FSP, QAPP, and Health and Safety Plans as specified in the SOW Order. The EPA has designated Mr. Richard Ho as the Agency's Project Manager.

7.2 RESPONDENT

Honeywell and the ESAG are the Respondents for the Quanta Resources Site OU1. The Respondents are responsible for the RI/FS. The Respondents have designated Mr. Tim Metcalf of Honeywell as the Designated Project Coordinator and primary contact for this project.

7.3 PARSONS

The Parsons management and technical staff required to execute this project and their areas of responsibility are identified below. The responsibilities of key personnel are further described as follows:

Honeywell Program Manager

Mr. Paul Norian, P.E. is the Honeywell Program Manager. He is responsible for contact with Honeywell for corporate matters. Mr. Norian is ultimately responsible for the performance of the Parsons project team and the quality of work.

Project Manager

Mr. Paul Feshbach-Meriney will be the Project Manager for this project. Mr. Feshbach-Meriney will be directly responsible to Honeywell and Parsons management to ensure that the project objectives are met. Mr. Feshbach-Meriney will be responsible for maintaining the

project schedule, keeping the project within budget, and ensuring the technical adequacy of the work performed. He will also be the primary point of contact for Honeywell on all technical, schedule, and contractual issues. Dominick DeAngelis, Superfund Project Manager with ExxonMobil Remediation will be the primary contact for the ESAG Technical Group.

Technical Directors

Ms. Susan Fullerton will be the Technical Director for this project to: 1) provide innovative and sophisticated input to various technical questions as they arise; 2) ensure compliance with all regulatory guidelines; and 3) to provide senior review of the work at key points. Ms. Fullerton will provide technical support and overall quality assurance for the RI/FS.

Health and Safety Officer

The Health and Safety Officer for this project will be Mr. Andy Soos. Mr. Soos will ensure that the health and safety plan is properly implemented and that all Parsons and subcontractor site personnel are trained in the site-specific project health and safety requirements. Mr. Soos will have authority to stop work if unsafe conditions are observed.

QA Officer

Ms. Chunhua Liu will be the Quality Assurance (QA) officer for this project. Ms. Liu will be responsible for verifying that the field teams, laboratory and other subcontractors, follow all QA requirements. She will also perform the data validation.

Remedial Investigation Manager

Mr. James Goldrick will be the Remedial Investigation Manager. Mr. Goldrick will be responsible for coordinating, scheduling, and controlling RI activities at the Site to ensure that adequate data are collected. Mr. Goldrick will also be responsible for coordinating the preparation of the Remedial Investigation Report.

Feasibility Study Manager

Mr. Theodoros (Ted) Toskos will be the Feasibility Study Manager for this project. He will be responsible for coordinating, scheduling, and controlling the preparation of the Feasibility Study.

TABLES

Table 7-1 Key Project Contacts

Table 7-1
Key Project Contacts
Quanta Resources Site
Edgewater, New Jersey

U.S. ENVIRONMENTAL PROTECTION AGENCY

Quanta Resources Site Remedial

Project Manager

Mr. Richard Ho

New Jersey Remediation Branch

Emergency and Remediation Response Division

U.S. Environmental Protection Agency,

Region II

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New York, NY 10007-1866

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Fax: 212-637-4429

Quanta Resources Site Attorney

Clay Monroe

New Jersey Superfund Branch

Office of Regional Counsel

U.S. Environmental Protection Agency,

Region II

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New York, NY 10007-1866

Phone: 212-633-3115

Fax: 212-637-3115

NEW JERSEY STATE DEPARTMENT OF ENVIRONMENTAL PROTECTION

Quanta Site Manager

Robert Hayton

Bureau of Federal Case Management

New Jersey Department of Environmental Protection

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Trenton, NJ 08625-0028

Phone: (609)-633-0744

Fax: (609)-633-1439

HONEYWELL INTERNATIONAL INC.

Primary Contact/Invoice Approval

Tim Metcalf

Project Manager

Honeywell International Inc.

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Morristown, NJ 07962

Phone: (973) 455-4107

Fax: (973) 455-3082

Email: tim.metcalf@honeywell.com

**Table 7-1 (Cont.)
Key Project Contacts
Quanta Resources Site
Edgewater, New Jersey**

PARSONS CONTACTS

Project Manager

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Parsons

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Feasibility Study Manager

Theodoros Toskos

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Fax: (973) 868-3110

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SECTION 8

PROJECT SCHEDULE

A project schedule was developed for OU1. The schedule was developed based on the information provided in the OU1 AOC/SOW. The purpose of this section is to provide an understanding of the progression of tasks that will be performed to prepare the RI and FS documents for this project. The schedule is provided in Figure 8-1.

FIGURES

Figure 8-1 Project Schedule (OU1)

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ATTACHMENT A

Vapor Intrusion Investigation Workplan For Three Y LLC Development

VAPOR INTRUSION INVESTIGATION WORKPLAN

for Three Y LLC Development

Property Known As:

**Three Y, LLC Development
115 River Road
Edgewater, Bergen County, New Jersey**

Prepared for:

**Three Y, LLC
115 River Road, Suite 101
Edgewater, NJ 07020**

April 13, 2005

Submitted by:

**Environmental Waste Management Associates, LLC
P. O. Box 5430
Parsippany, New Jersey 07054
EWMA Case No. 204390**

**Prepared by: Ajay Kathuria, P.E.
Senior Project Engineer**

**Reviewed By: Scott Mikaelian, P.E.
Director, Engg. - RA Services**

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FIGURES

Sub-Slab Air Sampling Point Details

Figure 1

APPENDICES

Occupied Dwelling Questionnaire

Appendix 1

STL's USEPA TO-15 Compound List and RLs

Appendix 2

OSWER's Generic Screening Levels and Summary Sheet (Table 2b)

Appendix 3

USEPA Region 3s Risk Based Concentrations (RBCs) for Ambient Air

Appendix 4

1.0 INTRODUCTION

Three Y, LLC (Three Y) has retained Environmental Waste Management Associates, LLC (EWMA) to prepare this Workplan for conducting a vapor intrusion investigation on its subject property located at 115 River Road, Edgewater, NJ.

The subject property is located adjacent to and immediately south of the limits of the Quanta Resources Corporation (QRC) Superfund site, which was placed on the National Priority List (NPL) by the United States Environmental Protection Agency (USEPA) in September 2002.

The QRC site is currently the subject of on-going remedial investigations by Parsons Corporation (Parsons) on behalf of the primary responsible party (PRP) Honeywell Corporation (Honeywell) under an Administrative Order of Consent (AOC) with the USEPA Region 2. As part of the AOC, USEPA Region 2 has indicated that a vapor intrusion and indoor air investigation and exposure pathway assessment will be required for the building located on the subject property (115 River Road) in order to determine any potential impact from the groundwater contamination resulting from the past operations at the QRC site.

Three Y has proposed to undertake the vapor intrusion investigations in order to better control the access and coordination with tenants and to complete these investigations in an expedited manner.

The scope of work outlined in this Workplan is based on the guidance provided in the November 2002 document "*Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils*" issued by the USEPA Office of Solid Waste and Emergency Response (OSWER). In addition, the existing interim "*Vapor Intrusion Pathway – Indoor Air Guidance*" issued by the New Jersey Department of Environmental Protection (NJDEP) as been used as reference as part of preparing this Workplan.

1.1 VAPOR INTRUSION DEFINED

Per the OSWER guidance document, vapor intrusion is the migration of volatile chemicals from the subsurface into overlying buildings. Volatile chemicals in buried wastes and/or contaminated groundwater can emit vapors that may migrate through subsurface soils and into indoor air spaces of overlying buildings in ways similar to that of radon gas seeping into homes. The migration usually takes place through open sumps, joints and cracks in the floor slabs, footings, or foundation walls of the overlying buildings.

1.2 TARGET VOCs

Based on a review of the Removal Site Investigation Report (RSI) dated June 2000 and prepared by Geosyntec Consultants (Geosyntec) and recent information provided by Parsons on behalf of the PRP, the groundwater within the QRC site and in the vicinity, including the subject property, is contaminated with semi-volatile organic compounds (SVOCs) from the coal-tar contamination, metals, and volatile organic compounds (VOCs) from past operations at the QRC site.

Due to limiting chemical and physical properties, the compounds associated with the SVOCs and metals do not easily volatilize at ambient temperatures, and are not anticipated to be of concern during the vapor intrusion investigation. Therefore, only VOC compounds known to be associated with the past operations at the QRC site will be considered to establish target VOCs during the investigation.

A review of the groundwater investigation results present in the referenced RSI reports indicates that the highest concentrations of VOCs were detected for compounds related to petroleum hydrocarbons, such as benzene, toluene, ethylbenzene, and xylenes (BTEX) compounds.

In addition, low levels of chlorinated VOCs such as 1,1,1-Trichloroethane (1,1,1-TCA), 1,1-Dichloroethane (1,1-DCA), chlorobenzene, tetrachloroethylene (PCE), and trichloroethene (TCE) were also detected during the groundwater investigations. However, in general the concentrations of chlorinated VOCs were detected either below or slightly above the target groundwater concentrations provided in the OSWER's guidance document, which are established to determine a potential risk of vapor intrusion for such compounds. Nonetheless, these compounds will be analyzed as part of the proposed investigation in order to determine their potential presence as a result of vapor intrusion.

1.3 PROJECT OBJECTIVES

The OSWER's guidance document outlines a three (3) tiered approach to adequately determine the nature and extent of contamination, and identify potential exposure pathways and receptors that may be at risk from vapor intrusion. Tier 1 involves primary screening based on the general knowledge of the site and the chemicals known or reasonably suspected in the subsurface. Tier 2 involves secondary screening based on some limited site specific information about the contamination source and subsurface conditions. Tier 3 involves site-specific pathway assessment by collecting more detailed site-specific information and conducting confirmatory sub-slab and/or indoor air sampling.

Based on the extensive investigation previously conducted at the QRC site, and USEPA's requirement to conduct vapor intrusion investigation, EWMA has assumed that the subject property has already been evaluated against the Tier 1 and Tier 2 screening criteria.

Therefore, this Workplan focuses on the site-specific pathway assessment outlined in the Tier 3.

The following technical objectives are being proposed for this investigation:

- To determine the nature and levels of VOCs in the indoor air at the subject building, and if the levels are above the applicable short-term and long-term human health risk criteria;
- To determine if target VOCs known to exist in the groundwater contamination from the QRC site are also present in the indoor air at the subject building;
- To determine if a potential source of VOC vapor intrusion exists underneath the subject building as a result of the groundwater contamination from the past operations at the QRC site;
- To determine if any background (outside) or other indoor sources exist that may be contributing towards any of the target VOCs detected in the indoor air; and,
- To establish if groundwater contamination from the QRC site might be impacting the indoor air, or provide additional recommendations to complete the vapor intrusion pathway assessment.

2.0 VAPOR INTRUSION INVESTIGATION

Based upon the Tier 3 (site-specific) assessment as outlined in the OSWER's guidance document, EWMA proposes the following steps as part of the vapor intrusion investigation, which are further detailed in the subsections below:

1. A building inspection/ survey and indoor chemicals inventory in order to establish and/or remove any potential indoor sources of target VOCs in the building prior to air sampling;
2. Direct measurement of indoor air concentrations in order to determine the presence of target VOCs;
3. Direct measurement of ambient (outside) air concentrations in order to identify any background sources of the target VOCs; and,
4. Direct measurement of foundation (i.e. sub-slab) air concentrations in order to determine the presence of a potential vapor intrusion source.

The sub-slab air sampling step will be undertaken only if the previous steps indicate the presence of contaminants in the indoor air similar to those known to exist in the groundwater, and detected at concentrations above the background conditions.

2.1 BUILDING INSPECTION AND SURVEY

Prior to any indoor air sampling, EWMA will conduct a building inspection in order to identify any obvious or visible sources of target VOCs. In addition, the building owner and/or building manager will be required to complete an "Occupied Dwelling

Questionnaire" from the OSWER's guidance document in order to complete an indoor air assessment survey. A copy of this questionnaire is provided as **Appendix 1** with this Workplan. A complete inventory of all chemicals stored and/or used within the building and their locations is also recommended as part of completing the questionnaire.

The results of the building inspection and the information provided with the questionnaire will be used to identify any potential indoor sources of target VOCs and to arrange for their removal prior to any air sampling. In addition, the results will be used to aid in the final selection of the indoor air sampling locations.

2.2 INDOOR AIR SAMPLING

After the completion of the building inspection and survey, EWMA proposes to collect a total of approximately eight (8) indoor air samples at the subject property, as summarized below:

- Day Care Center: Four (4) samples with one in each room;
- Bank: One (1) representative air sample;
- Building 8: One (1) representative air sample;
- Building 9: One (1) representative air sample;
- Building 10: One (1) representative air sample.

The actual locations of the indoor air samples will be determined based on a review of the detailed floor plan, and the results of the building inspection and questionnaire. In general, the indoor air sampling locations will be biased towards the location of the source contamination in the groundwater, presence of sensitive receptors (e.g. children, elderly, etc.) and placed to attain a maximum coverage of the occupied areas of the building.

All eight (8) indoor air samples will be collected on the first occupied floor in the building in order to determine the actual risk to the building occupants.

EWMA will use the following indoor air sampling procedure:

- Air samples will be collected using certified and evacuated 6-Liter Summa[®] canisters;
- The Summa[®] canisters will be equipped with a flow regulator to allow for the collection of air samples over a period of 24 hours;
- The Summa[®] canisters will be placed within the breathing zone height (3-5') and in the areas with minimal interference from the building occupants; and,
- The Summa[®] canisters will be placed at the proposed sampling locations on a pre-determined date and time, and picked up at the approximately the same time the following day.

2.3 AMBIENT (OUTSIDE) AIR SAMPLING

In order to establish potential background sources of the target VOCs, EWMA proposes to collect at least three (3) ambient (outside) air samples at the following locations:

- Upwind from and at the limits of the subject property on the day of the sampling;
- Downwind from and at the limits of the subject property on the day of the sampling; and,
- In close proximity to the building at the ground level and away from any doorways or entrances.

Both upwind and downwind samples are proposed to be collected from the roof-top of the building if feasible, in order to provide a more secure location.

EWMA will use the same air sampling procedure for ambient air samples as outlined in Section 2.2 for indoor air samples.

2.4 SUB-SLAB AIR SAMPLING

The sub-slab air sampling is proposed to be conducted only if the results of the indoor/ambient air sampling and the building inspection indicate the presence of target contaminants known to exist in the groundwater at concentrations higher than the background conditions.

EWMA proposes to conduct sub-slab or foundation air sampling from at least three (3) separate locations within the subject building. The final locations of these sub-slab samples will be determined based on the results of the building inspection and questionnaire and a review of the most recent groundwater contamination delineation maps provided by Parsons.

For the purpose of this Workplan, EWMA has assumed that a six (6) inch concrete slab exists throughout the building areas that will be evaluated as part of this vapor intrusion investigation. If the occupied spaces have a basement, the sub-slab air sample locations will be installed through the slab in the basement.

EWMA will use the following sub-slab air sampling procedure:

- A 3/4-inch and 11 inches long drill bit with a carbide tip will be used to drill a hole in the concrete slab using a hammer drill;
- The drill bit will be then pushed into the sub-slab material approximately 3 inches below the concrete slab;
- A 1/4-inch and 10 inches long stainless steel pipe with a metal cap will be held in place in the hole, approximately 2 to 3 inches below the concrete slab and sealed with cement and/or bentonite around the pipe ;
- The cement will be allowed to cure for at least 1 hour;

- The metal cap on the stainless steel pipe will be removed and the pipe connected to a laboratory pump through a ¼-inch extension non-reactive tubing in order to purge the sampling port and the extension tubing;
- After purging, the ¼-inch extension tubing will be connected to the lab certified and evacuated 6-Liter Summa[®] canister for the collection of air sample; and,
- The air sample will be collected over a period of approximately 24 hours through a flow regulator attached to the Summa[®] canister.

A typical cross-section of the sub-slab air sampling point is shown in **Figure 1**.

2.5 LABORATORY ANALYSIS

All sub-slab, indoor air, and ambient air samples will be submitted to NJDEP certified STL laboratory in Burlington, VT for only selected and target volatile organic compounds (VOCs) using the USEPA Method TO-15.

A copy of the STL's USEPA TO-15 compound list and the proposed Reporting Limits (RLs) in parts per billion (ppb) and $\mu\text{g}/\text{m}^3$ is provided in **Appendix 2**.

The results of all air samples will be provided by STL on a standard two (2) week turnaround basis, in both electronic and hard copy format, and expressed in both ppb and $\mu\text{g}/\text{m}^3$.

3.0 DATA INTERPRETATION AND REPORTING

The OSWER's guidance document provides a list of target shallow soil gas and target indoor air concentrations for comparison against the sub-slab and indoor air samples data in order to evaluate the vapor intrusion potential and health risks.

The target indoor air concentrations are set at 10^{-4} , 10^{-5} and 10^{-6} incremental individual lifetime cancer risk levels and at a Hazard Quotient (HQ) of 1.0 for non-cancer risk. However, for most vapor intrusion investigations under the RCRA and CERCLA, USEPA generally recommends the use of the 10^{-5} values. This level, in EPA's view, serves as a generally reasonable screening mechanism for the vapor intrusion pathway.

Therefore, EWMA will compare the sub-slab and indoor air sampling data to the target shallow soil gas and target indoor air concentrations (for 10^{-5} risk level) provided in Table 2b (Generic Screening Levels and Summary Sheet) of the OSWER's guidance document.

A copy of the Table 2b from OSWER's guidance document is included as **Appendix 3** with this Workplan.

If the results of the sub-slab air sampling indicate that target VOCs exceed the target shallow soil gas concentrations, then a potential source of vapor intrusion will be deemed to be

present underneath the building with a likely source attributable to the groundwater contamination.

If the indoor air concentrations exceed the target concentration based on a 10^{-5} incremental individual lifetime cancer risk, then further investigation into the potential source will be deemed necessary. However, the actual source of such levels will be based upon the review of the sub-slab air sampling results as well as the ambient (outside) air sampling results in order to account for any background sources.

In addition to the target indoor air concentrations established for long-term health risks, EWMA will compare the indoor air sampling data with the Risk Based Concentrations (RBCs) for ambient air established by the USEPA Region 3. These values are based on a 10^{-6} incremental individual lifetime cancer risk and will be used for comparison purposes.

A copy of the USEPA Region 3 RBCs is included as **Appendix 4** with this Workplan.

In addition to the long-term health risk criteria, EWMA will perform a comparison of the sub-slab and indoor air sampling data to the Permissible Exposure Limits (PELs) established by the Occupational Safety and Health Administration (OSHA) for occupational settings. The PELs are defined as the maximum time weighted average (TWA) concentrations that a worker may be exposed to over any 8-hour work shift of a 40-hour work week without incurring the risk of adverse health effects. The purpose of this comparison will be only to establish any short-term health risks. As such, OSHA PELs are only applicable to occupational settings where workers may be exposed to the target VOCs as part of the work.

EWMA will provide the results of this investigation in the form of summary tables, and a letter report summarizing the findings and recommendations.

4.0 SCHEDULE OF ACTIVITIES

Upon approval of the proposed scope of work by the client, EWMA anticipates the following timeframe for various activities as part of the proposed vapor intrusion investigation:

- | | |
|---|-----------|
| • Mobilization: | 1 week; |
| • Building Inspection: | 1-2 days; |
| • Questionnaire: | 1 week; |
| • Indoor/ Ambient Air Sampling: | 2 days; |
| • Indoor/ Ambient Air Sampling Results: | 2 weeks; |
| • Sub-Slab Air sampling: | 1 week; |
| • Sub-Slab Air Sampling Results: | 2 weeks; |
| • Data Interpretation and Reporting: | 1 week. |

5.0 PROJECT PERSONNEL AND SUBCONTRACTORS

The following provides a list of EWMA personnel and Subcontractors that will be involved with the implementation of the proposed work:

Program Manager:	Scott Mikaelian, P.E. (EWMA)
Project Manager:	Ajay Kathuria, P.E. (EWMA)
Senior Environmental Technician :	Mark Richards (EWMA)
Environmental Technician:	Matt Gower (EWMA)
Certified Analytical Laboratory:	STL Burlington, VT (Subcontractor)

The list provided above is subject to change.

OCCUPIED DWELLING QUESTIONNAIRE

Indoor Air Assessment Survey

Date: _____

1. Name: _____

Address: _____

Home Phone: _____ Work Phone: _____

2. What is the best time to call to speak with you? _____ At: Work ☐ or Home ☐?

3. Are you the Owner ☐, Renter ☐, Other ☐ (please specify) _____
of this Home/Structure?

4. Total number of occupants/persons at this location? _____
Number of children? _____ Ages? _____

5. How long have you lived at this location? _____

General Home Description

6. Type of Home/Structure (check only one): Single Family Home ☐, Duplex ☐,
Condominium ☐, Townhouse ☐, Other ☐ _____

7. Home/Structure Description: number of floors _____
Basement? Yes ☐ No ☐
Crawl Space? Yes ☐ No ☐
If Yes, under how much of the house's area? ____%

8. Age of Home/Structure: _____ years, Not sure/Unknown ☐

9. General Above-Ground Home/Structure construction (check all that apply):
Wood ☐, Brick ☐, Concrete ☐, Cement block ☐, Other ☐ _____

10. Foundation Construction (check all that apply):
Concrete slab ☐
Fieldstone ☐
Concrete block ☐

- Elevated above ground/grade ☐
Other _____
11. What is the source of your drinking water (check all that apply)?
Public water supply ☐
Private well ☐
Bottled water ☐
Other, please specify _____
12. Do you have a private well for purposes other than drinking?
Yes ☐ No ☐
If yes, please describe what you use the well
for: _____

13. Do you have a septic system? Yes ☐ No ☐ Not used ☐ Unknown ☐
14. Do you have standing water outside your home (pond, ditch, swale)? Yes ☐ No ☐

Basement Description, please check appropriate boxes.
If you do not have a basement go to question 23.

15. Is the basement finished ☐ or unfinished ☐?
16. If finished, how many rooms are in the basement? _____
How many are used for more than 2 hours/day? _____
17. Is the basement floor (check all that apply) concrete ☐, tile ☐, carpeted ☐, dirt ☐,
other ☐ (describe) _____?
18. Are the basement walls poured concrete ☐, cement block ☐, stone ☐, wood ☐, brick ☐,
other ☐ _____?
19. Does the basement have a moisture problem (check one only)?
Yes, frequently (3 or more times/yr) ☐
Yes, occasionally (1-2 times/yr) ☐
Yes, rarely (less than 1 time/yr) ☐
No ☐
20. Does the basement ever flood (check one only)?
Yes, frequently (3 or more times/yr) ☐
Yes, occasionally (1-2 times/yr) ☐
Yes, rarely (less than 1 time/yr) ☐
No ☐
21. Does the basement have any of the following? (check all that apply) Floor cracks ☐,
Wall cracks ☐, Sump ☐, Floor drain ☐, Other hole/opening in floor ☐
(describe) _____

22. Are any of the following used or stored in the basement (check all that apply)
Paint ☐ Paint stripper/remover ☐ Paint thinner ☐
Metal degreaser/cleaner ☐ Gasoline ☐ Diesel fuel ☐ Solvents ☐ Glue ☐
Laundry spot removers ☐ Drain cleaners ☐ Pesticides ☐
23. Have you recently (within the last six months) done any painting or remodeling in your home? Yes ☐ No ☐
If yes, please specify what was done, where in the home, and what month:

24. Have you installed new carpeting in your home within the last year? Yes ☐ No ☐
If yes, when and where? _____
25. Do you regularly use or work in a dry cleaning service (check only one box)?
Yes, use dry-cleaning regularly (at least weekly) ☐
Yes, use dry-cleaning infrequently (monthly or less) ☐
Yes, work at a dry cleaning service ☐
No ☐
26. Does anyone in your home use solvents at work?
Yes ☐ If yes, how many persons _____
No ☐ If no, go to question 28
27. If yes for question 26 above, are the work clothes washed at home? Yes ☐ No ☐
28. Where is the washer/dryer located?
Basement ☐
Upstairs utility room ☐
Kitchen ☐
Garage ☐
Use a Laundromat ☐
Other, please specify ☐ _____
29. If you have a dryer, is it vented to the outdoors? Yes ☐ No ☐
30. What type(s) of home heating do you have (check all that apply)
Fuel type: Gas ☐, Oil ☐, Electric ☐, Wood ☐, Coal ☐, Other _____
Heat conveyance system: Forced hot air ☐
Forced hot water ☐
Steam ☐
Radiant floor heat ☐
Wood stove ☐
Coal furnace ☐
Fireplace ☐
Other _____

31. Do you have air conditioning? Yes ☐ No ☐. If yes, please check the appropriate type(s)
 Central air conditioning ☐
 Window air conditioning unit(s) ☐
 Other ☐, please specify _____
32. Do you use any of the following? Room fans ☐, Ceiling fans ☐, Attic fan ☐
 Do you ventilate using the fan-only mode of your central air conditioning or forced air heating system? Yes ☐ No ☐
33. Has your home had termite or other pesticide treatment: Yes ☐ No ☐ Unknown ☐
 If yes, please specify type of pest controlled, _____
 and approximate date of service _____
34. Water Heater Type: Gas ☐, Electric ☐, By furnace ☐, Other ☐

 Water heater location: Basement ☐, Upstairs utility room ☐, Garage ☐, Other ☐ (please describe) _____
35. What type of cooking appliance do you have? Electric ☐, Gas ☐, Other ☐

36. Is there a stove exhaust hood present? Yes ☐ No ☐
 Does it vent to the outdoors? Yes ☐ No ☐
37. Smoking in Home:
 None ☐, Rare (only guests) ☐, Moderate (residents light smokers) ☐,
 Heavy (at least one heavy smoker in household) ☐
38. If yes to above, what do they smoke?
 Cigarettes ☐ Cigars ☐
 Pipe ☐ Other ☐
39. Do you regularly use air fresheners? Yes ☐ No ☐
40. Does anyone in the home have indoor home hobbies of crafts involving: None ☐
 Heating ☐, soldering ☐, welding ☐, model glues ☐, paint ☐, spray paint,
 wood finishing ☐, Other ☐ Please specify what type of hobby: _____
41. General family/home use of consumer products (please circle appropriate): Assume that
Never = never used, **Hardly ever** = less than once/month, **Occasionally** = about
 once/month, **Regularly** = about once/week, and **Often** = more than once/week.

Product _____ Frequency of Use _____

Spray-on deodorant Never Hardly ever Occasionally Regularly Often

Aerosol deodorizers	Never	Hardly ever	Occasionally	Regularly	Often
Insecticides	Never	Hardly ever	Occasionally	Regularly	Often
Disinfectants	Never	Hardly ever	Occasionally	Regularly	Often

(Question 41, continued)

<u>Product</u>	<u>Frequency of Use</u>				
Window cleaners	Never	Hardly ever	Occasionally	Regularly	Often
Spray-on oven cleaners	Never	Hardly ever	Occasionally	Regularly	Often
Nail polish remover	Never	Hardly ever	Occasionally	Regularly	Often
Hair sprays	Never	Hardly ever	Occasionally	Regularly	Often

42. Please check weekly household cleaning practices:

Dusting ☐

Dry sweeping ☐

Vacuuming ☐

Polishing (furniture, etc) ☐

Washing/waxing floors ☐

Other ☐ _____

43. Other comments: _____

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USEPA TO-15 Compound List and Reporting Limits

CAS	Compound	RL ppbv	RL ug/m3	NJRTO15 All
75-71-8	Dichlorodifluoromethane	0.5	2.45	X
74-87-3	Chloromethane	0.5	1.02	X
75-01-4	Vinyl Chloride	0.5	1.27	X
74-83-9	Bromomethane	0.5	1.92	X
75-00-3	Chloroethane	0.5	1.31	X
75-69-4	Trichlorofluoromethane	0.5	2.78	X
76-13-1	Freon TF	0.5	3.80	X
75-35-4	1,1-Dichloroethene	0.5	1.96	X
75-09-2	Methylene Chloride	0.5	1.71	X
75-34-3	1,1-Dichloroethane	0.5	2.00	X
156-59-2	cis-1,2-Dichloroethene	0.5	1.98	X
67-66-3	Chloroform	0.5	2.41	X
71-55-6	1,1,1-Trichloroethane	0.5	2.69	X
56-23-5	Carbon Tetrachloride	0.5	3.10	X
71-43-2	Benzene	0.5	1.59	X
107-06-2	1,2-Dichloroethane	0.5	2.00	X
79-01-6	Trichloroethene	0.5	2.65	X
78-87-5	1,2-Dichloropropane	0.5	2.29	X
10061-01-5	cis-1,3-Dichloropropene	0.5	2.24	X
108-88-3	Toluene	0.5	1.88	X
10061-02-6	trans-1,3-Dichloropropene	0.5	2.24	X
79-00-5	1,1,2-Trichloroethane	0.5	2.69	X
127-18-4	Tetrachloroethene	0.5	3.35	X
108-90-7	Chlorobenzene	0.5	2.29	X
100-41-4	Ethylbenzene	0.5	2.16	X
1330-20-7	Xylene (m,p)	0.5	2.16	X
100-42-5	Styrene	0.5	2.12	X
95-47-6	Xylene (o)	0.5	2.16	X
79-34-5	1,1,2,2-Tetrachloroethane	0.5	3.39	X
541-73-1	1,3-Dichlorobenzene	0.5	3.00	X
106-46-7	1,4-Dichlorobenzene	0.5	3.00	X
95-50-1	1,2-Dichlorobenzene	0.5	2.98	X
120-82-1	1,2,4-Trichlorobenzene	0.5	3.67	X
87-68-3	Hexachlorobutadiene	0.5	5.27	X
108-67-8	1,3,5-Trimethylbenzene	0.5	2.45	X
95-63-6	1,2,4-Trimethylbenzene	0.5	2.45	X
76-14-2	1,2-Dichlorotetrafluoroethane	0.5	3.47	X
106-93-4	1,2-Dibromoethane	0.5	3.80	X
106-99-0	1,3-Butadiene	0.5	1.10	X

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Colchester, VT 05446

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USEPA TO-15 Compound List and Reporting Limits (Continued)

CAS	Compound	RL ppbv	RL ug/m3	NJRTO15 All
75-15-0	Carbon Disulfide	0.5	1.55	X
67-64-1	Acetone	5	11.84	X
67-63-0	Isopropyl Alcohol	5	12.24	
1634-04-4	Methyl tert-Butyl Ether	0.5	1.80	X
110-82-7	Cyclohexane	0.5	1.71	X
124-48-1	Dibromochloromethane	0.5	4.24	X
78-93-3	Methyl Ethyl Ketone	0.5	1.47	X
123-91-1	1,4-Dioxane	5	17.96	
108-10-1	Methyl Isobutyl Ketone	0.5	2.04	X
591-78-6	Methyl Butyl Ketone	0.5	2.04	
75-25-2	Bromoform	0.5	5.10	X
75-27-4	Bromodichloromethane	0.5	3.31	X
156-60-5	trans-1,2-Dichloroethene	0.5	1.98	X
622-96-8	4-Ethyltoluene	0.5	2.45	X
107-05-1	3-Chloropropene	0.5	1.55	X
540-84-1	2,2,4-Trimethylpentane	0.5	2.33	X
593-60-2	Bromoethene	0.5	2.16	X
95-49-8	2-Chlorotoluene	0.5	2.57	X
110-54-3	n-Hexane	0.5	1.76	X
109-99-9	Tetrahydrofuran	5	14.69	
142-82-5	n-Heptane	0.5	2.04	X
80-62-6	Methyl Methacrylate	0.5	2.04	
540-59-0	1,2-Dichloroethene (total)	0.5	1.98	
1330-20-7	Xylene (total)	0.5	2.16	
75-65-0	tert-Butyl Alcohol	5	15.10	X

Table 2b: Question 4 Generic Screening Levels and Summary Sheet¹
 Risk = 1×10^{-5}

CAS No.	Chemical	Compounds with Provisional Toxicity Data Extrapolated From Oral Sources	Basis of Target Concentration C _{cancer} risk NC=noncancer risk	Target Indoor Air Concentration to Satisfy Both the Prescribed Risk Level and the Target Hazard Index [R=10 ⁻⁵ , HI=1]		Measured or Reasonably Estimated Indoor Air Concentration [if available] (specify units)	Target Shallow Soil Gas Concentration Corresponding to Target Indoor Air Gas to Indoor Air Attenuation Factor=0.1		Measured or Reasonably Estimated Shallow Soil Gas Concentration [if available] (specify units)	Target Deep Soil Gas Concentration Corresponding to Target Indoor Air Concentration Where the Soil Gas to Indoor Air Attenuation Factor=0.01		Measured or Reasonably Estimated Deep Soil Gas Concentration [if available] (specify units)	Target Groundwater Concentration Corresponding to Target Indoor Air Concentration Where the Soil Gas to Indoor Air Attenuation Factor = 0.001 and Partitioning Across the Water Table Obeys Henry's Law		Measured or Reasonably Estimated Groundwater Concentration [if available] (specify units)
				C _{target} (ug/m ³)	(ppbv)		C _{soil-gas} (ug/m ³)	(ppbv)		C _{soil-gas} (ug/m ³)	(ppbv)		C _{gw} (ug/L)		
83329	Acenaphthene	X	NC	2.1E+02	3.3E+01		2.1E+03	3.3E+02		2.1E+04	3.3E+03		**		
75070	Acetaldehyde		NC	9.0E+00	5.0E+00		9.0E+01	5.0E+01		9.0E+02	5.0E+02		2.8E+03		
67641	Acetone	X	NC	3.5E+02	1.5E+02		3.5E+03	1.5E+03		3.5E+04	1.5E+04		2.2E+05		
75058	Acetonitrile		NC	6.0E+01	3.6E+01		6.0E+02	3.6E+02		6.0E+03	3.6E+03		4.2E+04		
98862	Acetophenone	X	NC	3.5E+02	7.1E+01		3.5E+03	7.1E+02		3.5E+04	7.1E+03		8.0E+05		
107028	Acrolein		NC	2.0E-02	8.7E-03		2.0E-01	8.7E-02		2.0E+00	8.7E-01		4.0E+00		
107131	Acrylonitrile		C	3.6E-01	1.7E-01		3.6E+00	1.7E+00		3.6E+01	1.7E+01		8.5E+01		
309002	Aldrin		C	5.0E-03	3.3E-04		5.0E-02	3.3E-03		5.0E-01	3.3E-02		7.1E-01		
319846	alpha-HCH (alpha-BHC)		C	1.4E-02	1.1E-03		1.4E-01	1.1E-02		1.4E+00	1.1E-01		3.1E+01		
100527	Benzaldehyde	X	NC	3.5E+02	8.1E+01		3.5E+03	8.1E+02		3.5E+04	8.1E+03		3.6E+05		
71432	Benzene		C	3.1E+00	9.8E-01		3.1E+01	9.8E+00		3.1E+02	9.8E+01		1.4E+01		
205992	Benzo(b)fluoranthene	X	C	1.2E-01	1.1E-02		1.2E+00	1.1E-01		**	**		**		
100447	Benzylchloride	X	C	5.0E-01	9.7E-02		5.0E+00	9.7E-01		5.0E+01	9.7E+00		3.0E-01		
91587	beta-Chloronaphthalene	X	NC	2.8E+02	4.2E+01		2.8E+03	4.2E+02		2.8E+04	4.2E+03		**		
92524	Biphenyl	X	NC	1.8E+02	2.8E+01		1.8E+03	2.8E+02		1.8E+04	2.8E+03		**		
111444	Bis(2-chloroethyl)ether		C	7.4E-02	1.3E-02		7.4E-01	1.3E-01		7.4E+00	1.3E+00		1.0E+02		
108601	Bis(2-chloroisopropyl)ether		C	2.4E+00	3.5E-01		2.4E+01	3.5E+00		2.4E+02	3.5E+01		5.1E+02		
542881	Bis(chloromethyl)ether		C	3.9E-04	8.4E-05		3.9E-03	8.4E-04		3.9E-02	8.4E-03		4.5E-02		
75274	Bromodichloromethane	X	C	1.4E+00	2.1E+01		1.4E+01	2.1E+00		1.4E+02	2.1E+01		2.1E+01		
75252	Bromoform		C	2.2E+01	2.1E+00		2.2E+02	2.1E+01		2.2E+03	2.1E+02		8.3E-02		
106990	1,3-Butadiene		C	8.7E-02	3.9E-02		8.7E-01	3.9E-01		8.7E+00	3.9E+00		2.9E-02		
75150	Carbon disulfide		NC	7.0E+02	2.2E+01		7.0E+03	2.2E+03		7.0E+04	2.2E+04		5.6E+02		
56235	Carbon tetrachloride		C	1.6E+00	2.6E-01		1.6E+01	2.6E+00		1.6E+02	2.6E+01		5.0E+00 ¹		
57749	Chlordane		C	2.4E-01	1.5E-02		2.4E+00	1.5E-01		2.4E+01	1.5E+00		**		
126998	2-Chloro-1,3-butadiene (chloroprene)		NC	7.0E+00	1.9E+00		7.0E+01	1.9E+01		7.0E+02	1.9E+02		1.4E+01		
108907	Chlorobenzene		NC	6.0E-01	1.3E+01		6.0E+02	1.3E+02		6.0E+03	1.3E+03		3.9E+02		
109693	1-Chlorobutane	X	NC	1.4E+03	3.7E+02		1.4E+04	3.7E+03		1.4E+05	3.7E+04		2.0E+03		
124481	Chlorodibromomethane	X	C	1.0E+00	1.2E-01		1.0E+01	1.2E+00		1.0E+02	1.2E+01		3.2E+01		
75456	Chlorodifluoromethane		NC	5.0E+04	1.4E+04		5.0E+05	1.4E+05		**	**		**		
75003	Chloroethane (ethyl chloride)		NC	1.0E+04	3.8E+03		1.0E+05	3.8E+04		1.0E+06	3.8E+05		2.8E+04		
67663	Chloroform		C	1.1E+00	2.2E-01		1.1E+01	2.2E+00		1.1E+02	2.2E+01		8.0E+01 ¹		
95578	2-Chlorophenol	X	NC	1.8E+01	3.3E+00		1.8E+02	3.3E+01		1.8E+03	3.3E+02		1.1E+03		
75296	2-Chloropropane		NC	1.0E+02	3.2E+01		1.0E+03	3.2E+02		1.0E+04	3.2E+03		1.7E+02		
218019	Chrysene	X	C	1.2E+01	1.2E+00		**	**		**	**		**		
156592	cis-1,2-Dichloroethylene	X	NC	3.5E+01	9.8E+00		3.5E+02	8.8E+01		3.5E+03	8.8E+02		2.1E+02		
123739	Crotonaldehyde (2-butenal)	X	C	4.5E-02	1.6E-02		4.5E-01	1.6E-01		4.5E+00	1.6E+00		5.6E+01		
98828	Cumene		NC	4.0E+02	8.1E+01		4.0E+03	8.1E+02		4.0E+04	8.1E+03		8.4E+00		

Table 2b: Question 4 Generic Screening Levels and Summary Sheet¹
Risk = 1×10^{-3}

CAS No.	Chemical	Compounds with Provisional Toxicity Data Extrapolated From Oral Sources	Basis of Target Concentration C _{cancer} risk NC=noncancer risk	Target Indoor Air Concentration to Satisfy Both the Prescribed Risk Level and the Target Hazard Index [R=10 ⁻³ , HI=1] C _{indoor-gas} (ug/m3) (ppbv)	Measured or Reasonably Estimated Indoor Air Concentration [if available] (specify units)	Target Shallow Soil Gas Concentration Corresponding to Target Indoor Air Concentration Where the Soil Gas to Indoor Air Attenuation Factor=0.1 C _{soil-gas} (ug/m3) (ppbv)	Measured or Reasonably Estimated Shallow Soil Gas Concentration [if available] (specify units)	Target Deep Soil Gas Concentration Corresponding to Target Indoor Air Concentration Where the Soil Gas to Indoor Air Attenuation Factor=0.01 C _{soil-gas} (ug/m3) (ppbv)	Measured or Reasonably Estimated Deep Soil Gas Concentration [if available] (specify units)	Target Groundwater Concentration Corresponding to Target Indoor Air Concentration Where the Soil Gas to Indoor Air Attenuation Factor = 0.001 and Partitioning Across the Water Table Obeys Henry's Law C _{gw} (ug/L)	Measured or Reasonably Estimated Groundwater Concentration [if available] (specify units)
72559	DDE	X	C	2.5E-01 1.9E-02		2.5E+00 1.9E-01		2.5E+01 1.9E+00		**	
132649	Dibenzofuran	X	NC	1.4E+01 2.0E+00		1.4E+02 2.0E+01		1.4E+03 2.0E+02		**	
96128	1,2-Dibromo-3-chloropropane		NC	2.0E-01 2.1E-02		2.0E+00 2.1E-01		2.0E+01 2.1E+00		3.3E+01	
106934	1,2-Dibromoethane (ethylene dibromide)		C	1.1E-01 1.4E-02		1.1E+00 1.4E-01		1.1E+01 1.4E+00		3.6E+00	
541731	1,3-Dichlorobenzene	X	NC	1.1E+02 1.7E+01		1.1E+03 1.7E+02		1.1E+04 1.7E+03		8.3E+02	
95501	1,2-Dichlorobenzene		NC	2.0E+02 3.3E+01		2.0E+03 3.3E+02		2.0E+04 3.3E+03		2.6E+03	
106467	1,4-Dichlorobenzene		NC	8.0E+02 1.3E+02		8.0E+03 1.3E+03		8.0E+04 1.3E+04		8.2E+03	
75718	Dichlorodifluoromethane		NC	2.0E+02 4.0E+01		2.0E+03 4.0E+02		2.0E+04 4.0E+03		1.4E+01	
75343	1,1-Dichloroethane		NC	5.0E+02 1.2E+02		5.0E+03 1.2E+03		5.0E+04 1.2E+04		2.2E+03	
107062	1,2-Dichloroethane		C	9.4E-01 2.3E-01		9.4E+00 2.3E+00		9.4E+01 2.3E+01		2.3E+01	
75354	1,1-Dichloroethylene		NC	2.0E+02 5.0E+01		2.0E+03 5.0E+02		2.0E+04 5.0E+03		1.9E+02	
78875	1,2-Dichloropropane		NC	4.0E+00 8.7E-01		4.0E+01 8.7E+00		4.0E+02 8.7E+01		3.5E+01	
542756	1,3-Dichloropropene		C	6.1E+00 1.3E+00		6.1E+01 1.3E+01		6.1E+02 1.3E+02		8.4E+00	
60571	Dieldrin		C	5.3E-03 3.4E-04		5.3E-02 3.4E-03		5.3E-01 3.4E-02		8.6E+00	
115297	Endosulfan	X	NC	2.1E+01 1.3E+00		2.1E+02 1.3E+01		** **		**	
106898	Epichlorohydrin		NC	1.0E+00 2.6E-01		1.0E+01 2.6E+00		1.0E+02 2.6E+01		8.0E+02	
60297	Ethyl ether	X	NC	7.0E+02 2.3E+02		7.0E+03 2.3E+03		7.0E+04 2.3E+04		5.2E+02	
141786	Ethylacetate	X	NC	3.2E+03 8.7E+02		3.2E+04 8.7E+03		3.2E+05 8.7E+04		5.6E+05	
100414	Ethylbenzene		C	2.2E+01 5.1E+00		2.2E+02 5.1E+01		2.2E+03 5.1E+02		7.0E+02 ¹	
75218	Ethylene oxide		C	2.4E-01 1.4E-01		2.4E+00 1.4E+00		2.4E+01 1.4E+01		1.1E+01	
97632	Ethylmethacrylate	X	NC	3.2E+02 6.8E+01		3.2E+03 6.8E+02		3.2E+04 6.8E+03		9.1E+03	
86737	Fluorene	X	NC	1.4E+02 2.1E+01		1.4E+03 2.1E+02		** **		**	
110009	Furan	X	NC	3.5E+00 1.3E+00		3.5E+01 1.3E+01		3.5E+02 1.3E+02		1.6E+01	
58899	gamma-HCH (Lindane)	X	C	6.6E-02 5.5E-03		6.6E-01 5.5E-02		6.6E+00 5.5E-01		1.1E+02	
76448	Heptachlor		C	1.9E-02 1.2E-03		1.9E-01 1.2E-02		1.9E+00 1.2E-01		4.0E-01 ¹	
87683	Hexachloro-1,3-butadiene		C	1.1E+00 1.0E-01		1.1E+01 1.0E+00		1.1E+02 1.0E+01		3.3E+00	
118741	Hexachlorobenzene		C	5.3E-02 4.5E-03		5.3E-01 4.5E-02		5.3E+00 4.5E-01		1.0E+00 ¹	
77474	Hexachlorocyclopentadiene		NC	2.0E-01 1.8E-02		2.0E+00 1.8E-01		2.0E+01 1.8E+00		5.0E+01 ¹	
67721	Hexachloroethane		C	6.1E+00 6.3E-01		6.1E+01 6.3E+00		6.1E+02 6.3E+01		3.8E+01	
110543	Hexane		NC	2.0E+02 5.7E+01		2.0E+03 5.7E+02		2.0E+04 5.7E+03		2.9E+00	
74808	Hydrogen cyanide		NC	3.0E+00 2.7E+00		3.0E+01 2.7E+01		3.0E+02 2.7E+02		5.5E+02	
78831	Isobutanol	X	NC	1.1E+03 3.5E+02		1.1E+04 3.5E+03		1.1E+05 3.5E+04		2.2E+06	
7439976	Mercury (elemental)		NC	3.0E-01 3.7E-02		3.0E+00 3.7E-01		3.0E+01 3.7E+00		6.8E-01	
126987	Methacrylonitrile		NC	7.0E-01 2.6E-01		7.0E+00 2.6E+00		7.0E+01 2.6E+01		6.9E+01	
72435	Methoxychlor	X	NC	1.8E+01 1.2E+00		** **		** **		**	
79209	Methyl acetate	X	NC	3.5E+03 1.2E+03		3.5E+04 1.2E+04		3.5E+05 1.2E+05		7.2E+05	
96333	Methyl acrylate	X	NC	1.1E+02 3.0E+01		1.1E+03 3.0E+02		1.1E+04 3.0E+03		1.4E+04	

Table 2b: Question 4 Generic Screening Levels and Summary Sheet¹
Risk = 1×10^{-5}

CAS No.	Chemical	Compounds with Provisional Toxicity Data Extrapolated From Oral Sources	Basis of Target Concentration C=cancer risk NC=noncancer risk	Target Indoor Air Concentration to Satisfy Both the Prescribed Risk Level and the Target Hazard Index ($R=10^{-5}$, $HI=1$) C_{target}		Measured or Reasonably Estimated Indoor Air Concentration [if available] (specify units)	Target Shallow Soil Gas Concentration Corresponding to Target Indoor Air Concentration Where the Soil Gas to Indoor Air Attenuation Factor=0.1 $C_{soil-gas}$		Measured or Reasonably Estimated Shallow Soil Gas Concentration [if available] (specify units)	Target Deep Soil Gas Concentration Corresponding to Target Indoor Air Concentration Where the Soil Gas to Indoor Air Attenuation Factor=0.01 $C_{soil-gas}$		Measured or Reasonably Estimated Deep Soil Gas Concentration [if available] (specify units)	Target Groundwater Concentration Corresponding to Target Indoor Air Concentration Where the Soil Gas to Indoor Air Attenuation Factor = 0.001 and Partitioning Across the Water Table Obeys Henry's Law C_{gw}		Measured or Reasonably Estimated Groundwater Concentration [if available] (specify units)
				(ug/m3)	(ppbv)		(ug/m3)	(ppbv)		(ug/m3)	(ppbv)		(ug/L)		
74839	Methyl bromide		NC	5.0E+00	1.3E+00		5.0E+01	1.3E+01		5.0E+02	1.3E+02		2.0E+01		
74873	Methyl chloride (chloromethane)		C	2.4E+01	1.2E+01		2.4E+02	1.2E+02		2.4E+03	1.2E+03		6.7E+01		
108872	Methylcyclohexane		NC	3.0E+03	7.5E+02		3.0E+04	7.5E+03		3.0E+05	7.5E+04		7.1E+02		
74953	Methylene bromide	X	NC	3.5E+01	4.9E+00		3.5E+02	4.9E+01		3.5E+03	4.9E+02		9.9E+02		
75092	Methylene chloride		C	5.2E+01	1.5E+01		5.2E+02	1.5E+02		5.2E+03	1.5E+03		5.8E+02		
78933	Methyl ethyl ketone (2-butanone)		NC	1.0E+03	3.4E+02		1.0E+04	3.4E+03		1.0E+05	3.4E+04		4.4E+05		
108101	Methyl isobutyl ketone		NC	8.0E+01	2.0E+01		8.0E+02	2.0E+02		8.0E+03	2.0E+03		1.4E+04		
80626	Methyl methacrylate		NC	7.0E+02	1.7E+02		7.0E+03	1.7E+03		7.0E+04	1.7E+04		5.1E+04		
91576	2-Methylnaphthalene	X	NC	7.0E+01	1.2E+01		7.0E+02	1.2E+02		7.0E+03	1.2E+03		3.3E+03		
163404	MTBE		NC	3.0E+03	8.3E+02		3.0E+04	8.3E+03		3.0E+05	8.3E+04		1.2E+05		
108383	m-Xylene	X	NC	7.0E+03	1.6E+03		7.0E+04	1.6E+04		7.0E+05	1.6E+05		2.3E+04		
91203	Naphthalene		NC	3.0E+00	5.7E-01		3.0E+01	5.7E+00		3.0E+02	5.7E+01		1.5E+02		
104518	n-Butylbenzene	X	NC	1.4E+02	2.6E+01		1.4E+03	2.6E+02		1.4E+04	2.6E+03		2.6E+02		
98953	Nitrobenzene		NC	2.0E+00	4.0E-01		2.0E+01	4.0E+00		2.0E+02	4.0E+01		2.0E+03		
79469	2-Nitopropane		C	9.0E-03	2.5E-03		9.0E-02	2.5E-02		9.0E-01	2.5E-01		1.8E+00		
924163	N-Nitroso-di-n-butylamine		C	1.5E-02	2.4E-03		1.5E-01	2.4E-02		1.5E+00	2.4E-01		1.2E+00		
103651	n-Propylbenzene	X	NC	1.4E+02	2.8E+01		1.4E+03	2.8E+02		1.4E+04	2.8E+03		3.2E+02		
88722	o-Nitrotoluene	X	NC	3.5E+01	6.2E+00		3.5E+02	6.2E+01		3.5E+03	6.2E+02		6.8E+04		
95476	o-Xylene	X	NC	7.0E+03	1.6E+03		7.0E+04	1.6E+04		7.0E+05	1.6E+05		3.3E+04		
106423	p-Xylene	X	NC	7.0E+03	1.6E+03		7.0E+04	1.6E+04		7.0E+05	1.6E+05		2.2E+04		
129000	Pyrene	X	NC	1.1E+02	1.3E+01			
135988	sec-Butylbenzene	X	NC	1.4E+02	2.6E+01		1.4E+03	2.6E+02		1.4E+04	2.6E+03		2.5E+02		
100425	Styrene		NC	1.0E+03	2.3E+02		1.0E+04	2.3E+03		1.0E+05	2.3E+04		8.9E+03		
98066	tert-Butylbenzene	X	NC	1.4E+02	2.6E+01		1.4E+03	2.6E+02		1.4E+04	2.6E+03		2.9E+02		
630206	1,1,1,2-Tetrachloroethane		C	3.3E+00	4.8E-01		3.3E+01	4.8E+00		3.3E+02	4.8E+01		3.3E+01		
79345	1,1,2,2-Tetrachloroethane		C	4.2E-01	6.1E-02		4.2E+00	5.1E-01		4.2E+01	6.1E+00		3.0E+01		
127184	Tetrachloroethylene		C	8.1E+00	1.2E+00		8.1E+01	1.2E+01		8.1E+02	1.2E+02		1.1E+01		
108883	Toluene		NC	4.0E+02	1.1E+02		4.0E+03	1.1E+03		4.0E+04	1.1E+04		1.5E+03		
156605	trans-1,2-Dichloroethylene	X	NC	7.0E+01	1.8E+01		7.0E+02	1.8E+02		7.0E+03	1.8E+03		1.8E+02		
78131	1,1,2-Trichloro-1,2,2-trifluoroethane		NC	3.0E+04	3.9E+03		3.0E+05	3.9E+04		3.0E+06	3.9E+05		1.5E+03		
120821	1,2,4-Trichlorobenzene		NC	2.0E+02	2.7E+01		2.0E+03	2.7E+02		2.0E+04	2.7E+03		3.4E+03		
79005	1,1,2-Trichloroethane		C	1.5E+00	2.8E-01		1.5E+01	2.8E+00		1.5E+02	2.8E+01		4.1E+01		
71556	1,1,1-Trichloroethane		NC	2.2E+03	4.0E+02		2.2E+04	4.0E+03		2.2E+05	4.0E+04		3.1E+03		
79016	Trichloroethylene ¹¹	X	C	2.2E+01	4.1E-02		2.2E+00	4.1E-01		2.2E+01	4.1E+00		5.0E+00 ⁷		
75694	Trichlorofluoromethane		NC	7.0E+02	1.2E+02		7.0E+03	1.2E+03		7.0E+04	1.2E+04		1.8E+02		
96184	1,2,3-Trichloropropane		NC	4.9E+00	8.1E-01		4.9E+01	8.1E+00		4.9E+02	8.1E+01		2.9E+02		
95636	1,2,4-Trimethylbenzene		NC	6.0E+00	1.2E+00		6.0E+01	1.2E+01		6.0E+02	1.2E+02		2.4E+01		

Table 2b: Question 4 Generic Screening Levels and Summary Sheet ¹Risk = 1×10^{-6}

CAS No.	Chemical	Compounds with Provisional Toxicity Data Extrapolated From Oral Sources	Basis of Target Concentration C=cancer risk NC=noncancer risk	Target Indoor Air Concentration to Satisfy Both the Prescribed Risk Level and the Target Hazard Index [R=10 ⁻³ , HI=1] C _{target}		Measured or Reasonably Estimated Indoor Air Concentration [if available] (specify units)	Target Shallow Soil Gas Concentration Corresponding to Target Indoor Air Concentration Where the Soil Gas to Indoor Air Attenuation Factor=0.1 C _{soil-gas}		Measured or Reasonably Estimated Shallow Soil Gas Concentration [if available] (specify units)	Target Deep Soil Gas Concentration Corresponding to Target Indoor Air Concentration Where the Soil Gas to Indoor Air Attenuation Factor=0.01 C _{deep-gas}		Measured or Reasonably Estimated Deep Soil Gas Concentration [if available] (specify units)	Target Groundwater Concentration Corresponding to Target Indoor Air Concentration Where the Soil Gas to Indoor Air Attenuation Factor = 0.001 and Partitioning Across the Water Table Obeys Henry's Law C _{gw}		Measured or Reasonably Estimated Groundwater Concentration [if available] (specify units)
				(ug/m3)	(ppbv)		(ug/m3)	(ppbv)		(ug/m3)	(ppbv)		(ug/L)		
108678	1,3,5-Trimethylbenzene		NC	6.0E+00	1.2E+00		6.0E+01	1.2E+01		6.0E+02	1.2E+02		2.5E+01		
108054	Vinyl acetate		NC	2.0E+02	5.7E+01		2.0E+03	5.7E+02		2.0E+04	5.7E+03		9.6E+03		
75014	Vinyl chloride (chloroethene)		C	2.8E+00	1.1E+00		2.8E+01	1.1E+01		2.8E+02	1.1E+02		2.5E+00		
AF = 0.1 for Shallow Soil Gas Target Concentration AF = 0.01 for Deep Soil Gas Target Concentration AF = 0.001 for Groundwater Target Concentration * Health-based target breathing concentration exceeds maximum possible chemical vapor concentration (pathway incomplete) ** Target soil gas concentration exceeds maximum possible vapor concentration (pathway incomplete) † The target groundwater concentration is the MCL. (The MCL for chloroform is the MCL for total Trihalomethanes. The MCL listed for m-Xylene, o-Xylene, and p-Xylene is the MCL for total Xylenes.) †† The target concentration for trichloroethylene is based on the upper bound cancer slope factor identified in EPA's draft risk assessment for trichloroethylene (US EPA, 2001). The slope factor is based on state-of-the-art methodology, however the TCE assessment is still undergoing review. As a result, the slope factor and the target concentration values for TCE may be revised further. (See Appendix D.)															

Sources: I = IRIS H = HEAST A = HEAST Alternate W = Withdrawn from IRIS or HEAST E = EPA/NCEA provisional value O = other P = EPA provisional peer-reviewed value							Basic C = Carcinogenic effects N = Noncarcinogenic effects * = RBC at HI of 3.1 * RBC-c, see Alternate RBCs ** = See Alternate RBCs					Region III SSLs	
Chemical	CAS	RfDo mg/kg/d	CSFo 1/mg/kg/d	RfDi mg/kg/d	CSFi 1/mg/kg/d	VOC	Risk-based concentrations					Soil, for groundwater migration	
							Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Industrial mg/kg	Residential mg/kg	DAF 1 mg/kg	DAF 20 mg/kg
ACETALDEHYDE	75070			2.57E-03 I	7.7E-03 I	y	1.6E+00 C	8.1E-01 C				3.8E-04	7.7E-03 C
ACETOCHLOR	34256821	2E-02 I					7.3E+02 N	7.3E+01 N	2.7E+01 N	2.0E+04 N	1.6E+03 N		
ACETONE	67641	9.00E-01 I				y	5.5E+03 N	3.3E+03 N	1.2E+03 N	9.2E+05 N	7.0E+04 N	1.1E+00	2.2E+01 N
ACETONITRILE	75058			1.7E-02 I		y	1.2E+02 N	6.2E+01 N				2.9E-02	5.8E-01 N
ACETOPHENONE	98862	1.00E-01 I				y	6.1E+02 N	3.7E+02 N	1.4E+02 N	1.0E+05 N	7.8E+03 N	1.6E-01	3.2E+00 N
ACROLEIN	107028	5.00E-04 I		5.70E-06 I		y	4.2E-02 N	2.1E-02 N	6.8E-01 N	5.1E+02 N	3.9E+01 N	1.0E-05	2.0E-04 N
ACRYLAMIDE	79061	2.00E-04 I	4.50E+00 I		4.50E+00 I		1.5E-02 C	1.4E-03 C	7.0E-04 C	6.4E-01 C	1.4E-01 C	3.7E-06	7.4E-05 C
ACRYLONITRILE	107131	1.00E-03 H	5.40E-01 I	5.70E-04 I	2.40E-01 I	y	3.7E-02 C	2.8E-02 C	5.8E-03 C	5.3E+00 C	1.2E+00 C	7.4E-06	1.5E-04 C
ALACHLOR	15972608	1.00E-02 I	8.00E-02 H				8.4E-01 C	7.8E-02 C	3.9E-02 C	3.6E+01 C	8.0E+00 C	3.5E-04	7.0E-03 C
ALAR	1596845	1.50E-01 I					5.5E+03 N	5.5E+02 N	2.0E+02 N	1.5E+05 N	1.2E+04 N		
ALDICARB	116063	1.00E-03 I					3.7E+01 N	3.7E+00 N	1.4E+00 N	1.0E+03 N	7.8E+01 N	1.0E-02	2.1E-01 N
ALDICARB SULFONE	1646884	1.00E-03 I					3.7E+01 N	3.7E+00 N	1.4E+00 N	1.0E+03 N	7.8E+01 N	7.5E-03	1.5E-01 N
ALDRIN	309002	3.00E-05 I	1.70E+01 I		1.70E+01 I		3.9E-03 C	3.7E-04 C	1.9E-04 C	1.7E-01 C	3.8E-02 C	3.8E-04	7.7E-03 C
ALUMINUM	7429905	1.00E+00 P		1.00E-03 P			3.7E+04 N	3.7E+00 N	1.4E+03 N	1.0E+06 N	7.8E+04 N		
AMINODINITROTOLUENES		2.00E-04 E					7.3E+00 N	7.3E-01 N	2.7E-01 N	2.0E+02 N	1.6E+01 N		
4-AMINOPYRIDINE	504245	2.00E-05 H					7.3E-01 N	7.3E-02 N	2.7E-02 N	2.0E+01 N	1.6E+00 N		
AMMONIA	7664417			2.86E-02 I		y	2.1E+02 N	1.0E+02 N					
ANILINE	62533	7.00E-03 P	5.70E-03 I	2.90E-04 I			1.2E+01 C	1.1E+00 N	5.5E-01 C	5.0E+02 C	1.1E+02 C	6.8E-03	1.4E-01 C
ANTIMONY	7440360	4.00E-04 I					1.5E+01 N	1.5E+00 N	5.4E-01 N	4.1E+02 N	3.1E+01 N	6.6E-01	1.3E+01 N
ANTIMONY PENTOXIDE	1314609	5.00E-04 H					1.8E+01 N	1.8E+00 N	6.8E-01 N	5.1E+02 N	3.9E+01 N		
ANTIMONY TETROXIDE	1332916	4.00E-04 H					1.5E+01 N	1.5E+00 N	5.4E-01 N	4.1E+02 N	3.1E+01 N		
ANTIMONY TRIOXIDE	1309644	4.00E-04 H		5.70E-05 I			1.5E+01 N	2.1E-01 N	5.4E-01 N	4.1E+02 N	3.1E+01 N		
ARSENIC	7440382	3.00E-04 I	1.50E+00 I		1.51E+01 I		4.5E-02 C	4.1E-04 C	2.1E-03 C	1.9E+00 C	4.3E-01 C	1.3E-03	2.6E-02 C
ARSINE	7784421			1.40E-05 I		y	1.0E-01 N	5.1E-02 N					
ASSURE	76578148	9.00E-03 I					3.3E+02 N	3.3E+01 N	1.2E+01 N	9.2E+03 N	7.0E+02 N		
ATRAZINE	1912249	3.50E-02 I	2.20E-01 H				3.0E-01 C	2.8E-02 C	1.4E-02 C	1.3E+01 C	2.9E+00 C	4.4E-04	8.8E-03 C
AZOBENZENE	103333		1.10E-01 I		1.10E-01 I		6.1E-01 C	5.7E-02 C	2.9E-02 C	2.6E+01 C	5.8E+00 C	1.8E-03	3.5E-02 C
BARIUM	7440393	7.00E-02 I		1.40E-04 A			2.6E+03 N	5.1E-01 N	9.5E+01 N	7.2E+04 N	5.5E+03 N	1.1E+02	2.1E+03 N
BAYGON	114261	4.00E-03 I					1.5E+02 N	1.5E+01 N	5.4E+00 N	4.1E+03 N	3.1E+02 N		
BAYTHROID	68359375	2.50E-02 I					9.1E+02 N	9.1E+01 N	3.4E+01 N	2.6E+04 N	2.0E+03 N		
BENTAZON	25057890	3.00E-02 I					1.1E+03 N	1.1E+02 N	4.1E+01 N	3.1E+04 N	2.3E+03 N		
BENZALDEHYDE	100527	1.00E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	1.0E+05 N	7.8E+03 N		
BENZENE	71432	4.00E-03 I	5.5E-02 I	8.6E-03 I	2.7E-02 I	y	3.4E-01 C	2.3E-01 C	5.7E-02 C	5.2E+01 C	1.2E+01 C	9.5E-05	1.9E-03 C
BENZENETHIOL	108985	1.00E-05 H				y	6.1E-02 N	3.7E-02 N	1.4E-02 N	1.0E+01 N	7.8E-01 N		
BENZIDINE	92875	3.00E-03 I	2.30E+02 I		2.30E+02 I		2.9E-04 C	2.7E-05 C	1.4E-05 C	1.2E-02 C	2.8E-03 C		
BENZOIC ACID	65850	4.00E+00 I					1.5E+05 N	1.5E+04 N	5.4E+03 N	4.1E+06 N	3.1E+05 N		
BENZYL ALCOHOL	100516	3.00E-01 H					1.1E+04 N	1.1E+03 N	4.1E+02 N	3.1E+05 N	2.3E+04 N	4.4E+00	8.8E-01 N
BENZYL CHLORIDE	100447		0.17 I			y	6.2E-02 C	3.7E-02 C	1.9E-02 C	1.7E+01 C	3.8E+00 C	1.9E-05	3.7E-04 C
BERYLLIUM	7440417	2.00E-03 I		5.7E-06 I	8.40E+00 I		7.3E+01 N	7.5E-04 C	2.7E+00 N	2.0E+03 N	1.6E+02 N	5.8E-01	1.2E+03 N
BIPHENYL	92524	5.00E-02 I				y	3.0E+02 N	1.8E+02 N	6.8E+01 N	5.1E+04 N	3.9E+03 N	4.8E+00	9.6E-01 N
BIS(2-CHLOROETHYL)ETHER	111444		1.10E+00 I		1.10E+00 I	y	9.6E-03 C	5.7E-03 C	2.9E-03 C	2.6E+00 C	5.8E-01 C	2.2E-06	4.4E-05 C
BIS(2-CHLOROISOPROPYL)ETHER	108601	4.00E-02 I	7.00E-02 H		3.50E-02 H	y	2.6E-01 C	1.8E-01 C	4.5E-02 C	4.1E+01 C	9.1E+00 C	8.4E-05	1.7E-03 C
BIS(CHLOROMETHYL)ETHER	542881		2.20E+02 I		2.20E+02 I	y	4.8E-05 C	2.8E-05 C	1.4E-05 C	1.3E-02 C	2.9E-03 C	9.7E-09	1.9E-07 C
BIS(2-ETHYLHEXYL)PHTHALATE	117817	2.00E-02 I	1.40E-02 I		1.40E-02 E		4.8E+00 C	4.5E-01 C	2.3E-01 C	2.0E+02 C	4.6E+01 C	1.4E+02	2.9E+03 C
**BORON	7440428	2.00E-01 I		5.70E-03 H			7.3E+03 N	2.1E+01 N	2.7E+02 N	2.0E+05 N	1.6E+04 N		
**BROMOBENZENE	108961	2.00E-02 P		3.00E-03 P		y	2.1E+01 N	1.1E+01 N	2.7E+01 N	2.0E+04 N	1.6E+03 N		
BROMODICHLOROMETHANE	75274	2.00E-02 I	6.20E-02 I			y	1.7E-01 C	1.0E-01 C	5.1E-02 C	4.6E+01 C	1.0E+01 C	5.4E-05	1.1E-03 C
BROMOTHENE	593602			8.6E-04 I	1.10E-01 H	y	1.1E-01 C	5.7E-02 C				5.4E-05	1.1E-03 C
BROMOFORM	75252	2.00E-02 I	7.90E-03 I		3.90E-03 I		8.5E+00 C	1.6E+00 C	4.0E-01 C	3.6E+02 C	8.1E+01 C	3.3E-03	6.7E-02 C
BROMOMETHANE	74839	1.40E-03 I		1.40E-03 I		y	8.5E+00 N	5.1E+00 N	1.9E+00 N	1.4E+03 N	1.1E-02 N	2.1E-03	4.1E-02 N
BROMOPHOS	2104963	5.00E-03 H					1.8E+02 N	1.8E+01 N	6.8E+00 N	5.1E+03 N	3.9E+02 N		
1,3-BUTADIENE	106990			5.7E-04 I	1.00E-01 I	y	1.3E-01 C	6.3E-02 C				7.0E-05	1.4E-03 C
1-BUTANOL	71363	1.00E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	1.0E+05 N	7.8E+03 N	7.8E-01	1.6E+01 N
BUTYLBENZYLPHTHALATE	85687	2.00E-01 I					7.3E+03 N	7.3E+02 N	2.7E+02 N	2.0E+05 N	1.6E+04 N	8.4E-02	1.7E+04 N
BUTYLATE	2008415	5.00E-02 I					1.8E+03 N	1.8E+02 N	6.8E+01 N	5.1E+04 N	3.9E+03 N		
CADMIUM-WATER	7440439	5.00E-04 I		5.7E-05 E	6.30E+00 I		1.8E+01 N	9.9E-04 C	6.8E-01 N	5.1E+02 N	3.9E+01 N	1.4E+00	2.7E+01 N
CADMIUM-FOOD	7440439	1.00E-03 I		5.7E-05 E	6.30E+00 I		3.7E+01 N	9.9E-04 C	1.4E+00 N	1.0E+03 N	7.8E+01 N	2.7E+00	5.5E+01 N
CAPROLACTAM	105602	5.00E-01 I					1.8E+04 N	1.8E+03 N	6.8E+02 N	5.1E+05 N	3.9E+04 N		
CARBARYL	63252	1.00E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	1.0E+05 N	7.8E+03 N	1.5E+00	3.0E+01 N
CARBON DISULFIDE	75150	1.00E-01 I		2.00E-01 I		y	1.0E+03 N	7.3E+02 N	1.4E+02 N	1.0E+05 N	7.8E+03 N	9.5E-01	1.9E+01 N
CARBON TETRACHLORIDE	56235	7.00E-04 I	1.30E-01 I	5.71E-04 E	5.30E-02 I	y	1.6E-01 C	1.2E-01 C	2.4E-02 C	2.2E+01 C	4.9E+00 C	1.1E-04	2.1E-03 C
CARBOSULFAN	55285148	1.00E-02 I					3.7E+02 N	3.7E+01 N	1.4E+01 N	1.0E+04 N	7.8E+02 N		
CHLORAL HYDRATE	302170	1.00E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	1.0E+05 N	7.8E+03 N		
CHLORANIL	118752		4.00E-01 H				1.7E-01 C	1.6E-02 C	7.9E-03 C	7.2E+00 C	1.6E+00 C		
CHLORDANE	57749	5.00E-04 I	3.5E-01 I	2.00E-04 I	3.5E-01 I		1.9E-01 C	1.8E-02 C	9.0E-03 C	8.2E+00 C	1.6E+00 C	4.6E-02	9.2E-01 C
CHLORINE	7782505	1.00E-01 I		5.7E-05 E		y	4.2E-01 N	2.1E-01 N	1.4E+02 N	1.0E+05 N	7.8E+03 N		

Sources: I = IRIS H = HEAST A = HEAST Alternate W = Withdrawn from IRIS or HEAST E = EPA-NCEA provisional value Q = other P = EPA provisional peer-reviewed value							Risk-based concentrations					Region III SSLs	
Chemical	CAS	RfDo mg/kg/d	CSF ₀ 1/mg/kg/d	RfDi mg/kg/d	CSF ₁ 1/mg/kg/d	VOC	Tap water µg/l	Ambient air µg/m ³	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg	Soil for groundwater migration	
												DAF 1 mg/kg	DAF 20 mg/kg
CHLORINE DIOXIDE	10049044	3.00E-02 I		5.70E-05 I		y	4.2E-01 N	2.1E-01 N	4.1E+01 N	3.1E+04 N	2.3E+03 N		
CHLOROACETIC ACID	79118	2.00E-03 H					7.3E+01 N	7.3E+00 N	2.7E+00 N	2.0E+03 N	1.6E-02 N		
4-CHLOROANILINE	105478	4.00E-03 I					1.5E+02 N	1.5E+01 N	5.4E+00 N	4.1E+03 N	3.1E+02 N	4.8E-02	9.7E-01 N
CHLOROBENZENE	108907	2.00E-02 I		1.7E-02 E		y	1.1E+02 N	6.2E+01 N	2.7E+01 N	2.0E+04 N	1.6E+03 N	4.0E-02	8.0E-01 N
CHLOROBENZILATE	510156	2.00E-02 I	2.70E-01 H		2.70E-01 H		2.5E-01 C	2.3E-02 C	1.2E-02 C	1.1E-01 C	2.4E+00 C	1.3E-03	2.7E-02 C
P-CHLOROBENZOIC ACID	74113	2.00E-01 H					7.3E-03 N	7.3E+02 N	2.7E+02 N	2.0E+05 N	1.6E-04 N		
2-CHLORO-1,3-BUTADIENE	126998	2.00E-02 A		2.00E-03 H		y	1.4E-01 N	7.3E+00 N	2.7E+01 N	2.0E-04 N	1.6E-03 N	6.0E-03	1.2E-01 N
1-CHLOROBUTANE	109693	4.00E-01 H				y	2.4E-03 N	1.5E+03 N	5.4E+02 N	4.1E+05 N	3.1E+04 N	1.0E+00	2.0E+01 N
1-CHLORO-1,1-DIFLUOROETHANE	75683			1.40E+01 I		y	1.0E+05 N	5.1E+04 N				7.0E+01	1.4E+03 N
CHLORODIFLUOROMETHANE	75456			1.40E+01 I		y	1.0E+05 N	5.1E+04 N				7.0E+01	1.4E+03 N
CHLOROETHANE	75003	4.00E-01 E	2.90E-03 E	2.90E+00 I		y	3.6E+00 C	2.2E+00 C	1.1E+00 C	9.9E+02 C	2.2E+02 C	9.6E-04	1.9E-02 C
CHLOROFORM	67663	1.00E-02 I		1.4E-02 E	8.10E-02 I	y	1.5E-01 C	7.7E-02 C	1.4E+01 N	1.0E+04 N	7.8E-02 N	4.5E-05	9.1E-04 C
CHLOROMETHANE	74873			2.6E-02 I		y	1.9E-02 N	9.5E+01 N				4.6E-02	9.3E-01 N
4-CHLORO-2-METHYLANILINE	95692		5.80E-01 H				1.2E-01 C	1.1E-02 C	5.4E-03 C	4.9E+00 C	1.1E+00 C		
BETA-CHLORONAPHTHALENE	91587	8.00E-02 I				y	4.9E-02 N	2.9E+02 N	1.1E+02 N	8.2E+04 N	6.3E+03 N	1.6E+00	3.2E-01 N
O-CHLORONITROBENZENE	88733	1.00E-03 P	9.7E-03 P	2.00E-05 P		y	1.5E-01 N	7.3E-02 N	3.3E-01 C	3.0E-02 C	6.8E-01 C		
P-CHLORONITROBENZENE	100005	1.00E-03 P	6.7E-03 P	1.7E-04 P		y	1.2E+00 N	6.2E-01 N	4.7E-01 C	4.3E+02 C	7.8E-01 N		
2-CHLOROPHENOL	95578	5.00E-03 I				y	3.0E-01 N	1.8E+01 N	6.8E+00 N	5.1E+03 N	3.9E+02 N		
2-CHLOROPROPANE	75296			2.90E-02 H		y	2.1E-02 N	1.1E+02 N				6.6E-02	1.3E+00 N
O-CHLOROTOLUENE	95498	2.00E-02 I				y	1.2E-02 N	7.3E+01 N	2.7E+01 N	2.0E+04 N	1.6E-03 N	6.5E-02	1.3E+00 N
CHLORPYRIFOS	2921882	3.00E-03 I					1.1E-02 N	1.1E+01 N	4.1E-00 N	3.1E+03 N	2.3E-02 N	3.2E+00	6.3E+01 N
CHLORPYRIFOS-METHYL	5598130	1.00E-02 H					3.7E-02 N	3.7E-01 N	1.4E-01 N	1.0E-04 N	7.8E-02 N		
CHROMIUM III	16065831	1.50E+00 I					5.5E-04 N	5.5E+03 N	2.0E-03 N	1.5E-06 N	1.2E-05 N	9.9E-07	2.0E-09 N
CHROMIUM VI	18540299	3.00E-03 I		3.00E-05 I	4.10E+01 I		1.1E-02 N	1.5E-04 C	4.1E+00 N	3.1E+03 N	2.3E+02 N	2.1E+00	4.2E-01 N
COBALT	7440484	2.00E-02 P		5.7E-06 P	9.8 P		7.3E-02 N	6.4E-04 C	2.7E+01 N	2.0E+04 N	1.6E-03 N		
COKE OVEN EMISSIONS (COAL TAR)	8007452				2.2 I			2.8E-03 C					
COPPER	7440508	4.00E-02 H					1.5E+03 N	1.5E+02 N	5.4E-01 N	4.1E+04 N	3.1E+03 N	5.3E+02	1.1E-04 N
CUMENE	98828	1.00E-01 I		1.10E-01 I		y	6.8E+02 N	4.0E+02 N	1.4E+02 N	1.0E-05 N	7.8E-03 N	3.2E+00	6.4E-01 N
CYANIDE (FREE)	57125	2.00E-02 I					7.3E-02 N	7.3E-01 N	2.7E+01 N	2.0E-04 N	1.6E-03 N	7.4E+00	1.5E-02 N
CALCIUM CYANIDE	592018	4E-02 I					1.5E-03 N	1.5E+02 N	5.4E-01 N	4.1E-04 N	3.1E-03 N		
COPPER CYANIDE	544923	5.00E-03 I					1.8E-02 N	1.8E-01 N	6.8E+00 N	5.1E+03 N	3.9E-02 N		
CYANAZINE	21725462	2.00E-03 H	8.40E-01 H				8.0E-02 C	7.5E-03 C	3.8E-03 C	3.4E+00 C	7.6E-01 C	2.6E-05	5.3E-04 C
CYANOGEN	480195	4.00E-02 I				y	2.4E+02 N	1.5E+02 N	5.4E-01 N	4.1E+04 N	3.1E+03 N		
CYANOGEN BROMIDE	506683	9.00E-02 I					3.3E+03 N	3.3E+02 N	1.2E+02 N	9.2E+04 N	7.0E-03 N		
CYANOGEN CHLORIDE	506774	5.00E-02 I					1.8E-03 N	1.8E-02 N	6.8E-01 N	5.1E-04 N	3.9E-03 N		
HYDROGEN CYANIDE	74908	2.00E-02 I		8.60E-04 I		y	6.2E+00 N	3.1E+00 N	2.7E+01 N	2.0E-04 N	1.6E-03 N	1.1E-01	2.2E+00 N
POTASSIUM CYANIDE	151508	5.00E-02 I					1.8E-03 N	1.8E-02 N	6.8E-01 N	5.1E-04 N	3.9E-03 N		
POTASSIUM SILVER CYANIDE	506616	2.00E-01 I					7.3E-03 N	7.3E-02 N	2.7E+02 N	2.0E-05 N	1.6E-04 N		
SILVER CYANIDE	506649	1.00E-01 I					3.7E-03 N	3.7E-02 N	1.4E-02 N	1.0E-05 N	7.8E-03 N	3.1E-01	6.2E-02 N
SODIUM CYANIDE	143339	4.00E-02 I					1.5E-03 N	1.5E-02 N	5.4E-01 N	4.1E+04 N	3.1E-03 N		
THIOCYANATE		1.00E-04 E					3.7E+00 N	3.7E-01 N	1.4E-01 N	1.0E-02 N	7.8E-00 N		
ZINC CYANIDE	557211	5.00E-02 I					1.8E-03 N	1.8E-02 N	6.8E-01 N	5.1E-04 N	3.9E-03 N	1.1E+02	2.3E+03 N
CYCLOHEXANE	110827			1.70E+00 I		y	1.2E-04 N	6.2E-03 N					
CYCLOHEXANONE	108941	5.00E+00 I					1.8E-05 N	1.8E+04 N	6.8E-03 N	5.1E-06 N	3.9E-05 N	6.1E-01	1.2E+03 N
CYHALOTHRINKARATE	68085858	5.00E-03 I					1.8E-02 N	1.8E-01 N	6.8E+00 N	5.1E+03 N	3.9E-02 N		
CYPERMETHRIN	52315078	1.00E-02 I					3.7E-02 N	3.7E-01 N	1.4E-01 N	1.0E-04 N	7.8E-02 N		
DACTHAL	1861321	1.00E-02 I					3.7E-02 N	3.7E-01 N	1.4E-01 N	1.0E-04 N	7.8E-02 N		
DALAPON	75990	3.00E-02 I					1.1E-03 N	1.1E-02 N	4.1E-01 N	3.1E-04 N	2.3E-03 N	3.5E-01	7.1E+00 N
DDD	72548		2.40E-01 I				2.8E-01 C	2.6E-02 C	1.3E-02 C	1.2E+01 C	2.7E+00 C	5.6E-01	1.1E-01 C
DDE	72559		3.40E-01 I				2.0E-01 C	1.8E-02 C	9.3E-03 C	8.4E+00 C	1.9E+00 C	1.8E+00	3.5E-01 C
DDT	50293	5.00E-04 I	3.40E-01 I		3.40E-01 I		2.0E-01 C	1.8E-02 C	9.3E-03 C	8.4E+00 C	1.9E+00 C	5.8E-02	1.2E+00 C
DIAZINON	333415	9.00E-04 H					3.3E+01 N	3.3E+00 N	1.2E+00 N	9.2E+02 N	7.0E+01 N	2.1E-02	4.3E-01 N
DIBENZOFURAN	132649	2.00E-03 E				y	1.2E+01 N	7.3E+00 N	2.7E+00 N	2.0E+03 N	1.6E-02 N	1.9E-01	3.8E+00 N
1,4-DIBROMOBENZENE	106376	1.00E-02 I					3.7E-02 N	3.7E-01 N	1.4E+01 N	1.0E-04 N	7.8E-02 N		
DIBROMOCHLOROMETHANE	124481	2.00E-02 I	8.40E-02 I			y	1.3E-01 C	7.5E-02 C	3.8E-02 C	3.4E+01 C	7.6E+00 C	4.1E-05	8.3E-04 C
1,2-DIBROMO-3-CHLOROPROPANE	96128		1.40E+00 H	5.70E-05 I	2.40E-03 H	y	4.7E-02 C	2.1E-01 N	2.3E-03 C	2.0E+00 C	4.6E-01 C	4.4E-05	8.7E-04 C
1,1,2-DIBROMOETHANE	106934	9.00E-03 I	2.00E+00 I	2.6E-03 I	2.00E+00 I	y	5.3E-03 C	3.1E-03 C	1.6E-03 C	1.4E+00 C	3.2E-01 C	3.0E-06	6.0E-05 C
DIBUTYLPHTHALATE	84742	1.00E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	1.0E-05 N	7.8E-03 N	2.5E-02	5.0E-03 N
DICAMBA	1918009	3.00E-02 I					1.1E+03 N	1.1E-02 N	4.1E-01 N	3.1E-04 N	2.3E-03 N	2.2E-01	4.5E+00 N
1,2-DICHLOROBENZENE	95501	9.00E-02 I		4.00E-02 H		y	2.7E-02 N	1.5E-02 N	1.2E-02 N	9.2E+04 N	7.0E-03 N	2.3E-01	4.6E+00 N
1,3-DICHLOROBENZENE	541731	3.00E-03 E				y	1.8E-01 N	1.1E-01 N	4.1E-00 N	3.1E+03 N	2.3E-02 N	1.5E-02	2.9E-01 N
1,4-DICHLOROBENZENE	106467	3.00E-02 E	2.40E-02 H	2.29E-01 I	2.2E-02 E	y	4.7E-01 C	2.8E-01 C	1.3E-01 C	1.2E+02 C	2.7E-01 C	3.6E-04	7.1E-03 N
3,3'-DICHLOROBENZIDINE	91941		4.50E-01 I				1.5E-01 C	1.4E-02 C	7.0E-03 C	6.4E+00 C	1.4E+00 C	2.5E-04	4.9E-03 C
1,4-DICHLORO-2-BUTENE	764410				9.30E+00 H	y	1.3E-03 C	6.7E-04 C				4.0E-07	8.0E-06 C
DICHLORODIFLUOROMETHANE	75718	2.00E-01 I		5.00E-02 A		y	3.5E-02 N	1.8E-02 N	2.7E-02 N	2.0E-05 N	1.6E-04 N	5.5E-01	1.1E-01 N
1,1-DICHLOROETHANE	75343	1.00E-01 H		1.40E-01 A		y	8.0E-02 N	5.1E-02 N	1.4E-02 N	1.0E-05 N	7.8E-03 N	2.3E-01	4.5E+00 N

Sources: I = IRIS H = HEAST A = HEAST Alternate W = Withdrawn from IRIS or HEAST E = EPA-NCEA provisional value O = other P = EPA provisional peer-reviewed value							Basic C = Carcinogenic effects N = Noncarcinogenic effects I = RBC at H of 0.1 = RBC at see Alternate RBCs ? = See Alternate RBCs					Region III SSLs	
Chemical	CAS	RfDo mg/kg/d	CSFo 1/mg/kg/d	RfDi mg/kg/d	CSFi 1/mg/kg/d	VOC	Risk-based concentrations					Soil, for groundwater migration	
							Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg	DAF 1 mg/kg	DAF 20 mg/kg
1,2-DICHLOROETHANE	107062	2.00E-02 E	9.10E-02 I	1.40E-03 E	9.10E-02 I	y	1.2E-01 C	6.9E-02 C	3.5E-02 C	3.1E+01 C	7.0E+00 C	5.2E-05	1.0E-03 C
1,1-DICHLOROETHENE	75354	5.00E-02 I		6.00E-02 I		y	3.5E+02 N	2.2E+02 N	6.8E+01 N	5.1E+04 N	3.9E+03 N	1.5E-01	2.9E+00 N
CIS-1,2-DICHLOROETHENE	156592	1.00E-02 P				y	6.1E+01 N	3.7E+01 N	1.4E+01 N	1.0E+04 N	7.8E+02 N	1.7E-02	3.5E-01 N
TRANS-1,2-DICHLOROETHENE	156605	2.00E-02 I				y	1.2E+02 N	7.3E+01 N	2.7E+01 N	2.0E+04 N	1.6E+03 N	4.1E-02	8.2E-01 N
TOTAL 1,2-DICHLOROETHENE	540590	9.00E-03 H				y	5.5E+01 N	3.3E+01 N	1.2E+01 N	9.2E+03 N	7.0E+02 N	1.9E-02	3.7E-01 N
2,4-DICHLOROPHENOL	120832	3.00E-03 I					1.1E+02 N	1.1E+01 N	4.1E+00 N	3.1E+03 N	2.3E+02 N	6.0E-02	1.2E+00 N
2,4-D	94757	1.00E-02 I					3.7E+02 N	3.7E+01 N	1.4E+01 N	1.0E+04 N	7.8E+02 N	4.5E-01	9.0E+00 N
4-(2,4-DICHLOROPHENOXY)BUTYRIC ACID	94826	8E-03 I					2.9E+02 N	2.9E+01 N	1.1E+01 N	8.2E+03 N	6.3E+02 N		
1,2-DICHLOROPROPANE	78875		6.80E-02 H	1.14E-03 I		y	1.6E-01 C	9.2E-02 C	4.6E-02 C	4.2E+01 C	9.4E+00 C	1.0E-04	2.1E-03 C
1,3-DICHLOROPROPANE	142289	2.00E-02 P				y	1.2E+02 N	7.3E+01 N	2.7E+01 N	2.0E+04 N	1.6E+03 N		
2,3-DICHLOROPROPANOL	616239	3.00E-03 I					1.1E+02 N	1.1E+01 N	4.1E+00 N	3.1E+03 N	2.3E+02 N		
1,3-DICHLOROPROPENE	542756	3.00E-02 I	1.00E-01 I	5.71E-03 I	1.00E-02 I	y	4.4E-01 C	6.3E-01 C	3.2E-02 C	2.9E+01 C	6.4E+00 C	1.6E-04	3.1E-03 C
DICHLORVOS	62737	5E-04 I	0.29 I	1.43E-04 I			2.3E-01 C	2.2E-02 C	1.1E-02 C	9.9E+00 C	2.2E+00 C	5.5E-05	1.1E-03 C
DICYCLOPENTADIENE	77736	3E-02 H		6.00E-05 A		y	4.4E-01 N	2.2E-01 N	4.1E+01 N	3.1E+04 N	2.3E+03 N		
DIELDRIN	60571	5.00E-05 I	1.80E+01 I		1.60E+01 I		4.2E-03 C	3.9E-04 C	2.0E-04 C	1.8E-01 C	4.0E-02 C	1.1E-04	2.2E-03 C
DIESEL EMISSIONS				1.40E-03 I				5.1E+00 N					
DIETHYLPHTHALATE	84562	8.00E-01 I					2.9E+04 N	2.9E+03 N	1.1E+03 N	8.2E+05 N	6.3E+04 N	2.3E+01	4.5E+02 N
DIETHYLENE GLYCOL MONOBUTYL ETHER	112345	1.00E-02 P		5.70E-03 P			3.7E+02 N	2.1E+01 N	1.4E+01 N	1.0E+04 N	7.8E+02 N		
DIETHYLENE GLYCOL MONOETHYL ETHER	111900	6.00E-02 P		8.6E-04 P			2.2E+03 N	3.1E+00 N	8.1E+01 N	6.1E+04 N	4.7E+03 N		
D(2-ETHYLHEXYL)ADIPATE	103231	6.00E-01 I	1.20E-03 I				5.8E+01 C	5.2E+00 C	2.6E+00 C	2.4E+03 C	5.3E+02 C		
DIETHYLSTILBESTROL	56531		4.70E+03 H				1.4E-05 C	1.3E-06 C	6.7E-07 C	6.1E-04 C	1.4E-04 C		
DIFENZOQUAT (AVENGE)	43222486	8.00E-02 I					2.9E+03 N	2.9E+02 N	1.1E+02 N	8.2E+04 N	6.3E+03 N		
1,1-DIFLUOROETHANE	75376			1.10E+01 I		y	8.0E+04 N	4.0E+04 N					
DIISOPROPYL METHYLPHOSPHONATE (DIMP)	1445756	8.00E-02 I					2.9E+03 N	2.9E+02 N	1.1E+02 N	8.2E+04 N	6.3E+03 N		
3,3'-DIMETHOXYBENZIDINE	119904		1.40E-02 H				4.8E+00 C	4.5E-01 C	2.3E-01 C	2.0E+02 C	4.6E+01 C		
2,4-DIMETHYLANILINE HYDROCHLORIDE	21436964		5.80E-01 H				1.2E-01 C	1.1E-02 C	5.4E-03 C	4.9E+00 C	1.1E+00 C		
2,4-DIMETHYLANILINE	95681		7.50E-01 H				8.9E-02 C	8.3E-03 C	4.2E-03 C	3.8E+00 C	8.5E-01 C		
N,N-DIMETHYLANILINE	121697	2.00E-03 I					7.3E+01 N	7.3E+00 N	2.7E+00 N	2.0E+03 N	1.6E+02 N		
3,3'-DIMETHYLBENZIDINE	119937		2.30E+00 P				2.9E-02 C	2.7E-03 C	1.4E-03 C	1.2E+00 C	2.8E-01 C		
2,4-DIMETHYLPHENOL	105679	2.00E-02 I					7.3E+02 N	7.3E+01 N	2.7E+01 N	2.0E+04 N	1.6E+03 N	3.4E-01	6.7E+00 N
2,6-DIMETHYLPHENOL	576261	6.00E-04 I					2.2E+01 N	2.2E+00 N	8.1E-01 N	6.1E+02 N	4.7E+01 N		
3,4-DIMETHYLPHENOL	95658	1.00E-03 I					3.7E+01 N	3.7E+00 N	1.4E+00 N	1.0E+03 N	7.8E+01 N		
DIMETHYLPHTHALATE	131113	1.00E+01 W					3.7E+05 N	3.7E+04 N	1.4E+04 N	1.0E+07 N	7.8E+05 N		
1,2-DINITROBENZENE	528290	1.00E-04 P					3.7E+00 N	3.7E-01 N	1.4E-01 N	1.0E+02 N	7.8E+00 N		
1,3-DINITROBENZENE	99650	1.00E-04 I					3.7E+00 N	3.7E-01 N	1.4E-01 N	1.0E+02 N	7.8E+00 N	1.8E-03	3.7E-02 N
1,4-DINITROBENZENE	100254	1.00E-04 P					3.7E+00 N	3.7E-01 N	1.4E-01 N	1.0E+02 N	7.8E+00 N		
4,6-DINITRO-O-CYCLOHEXYL PHENOL	131895	2.00E-03 I					7.3E+01 N	7.3E+00 N	2.7E+00 N	2.0E+03 N	1.6E+02 N		
4,6-DINITRO-2-METHYLPHENOL	534521	1.00E-04 P					3.7E+00 N	3.7E-01 N	1.4E-01 N	1.0E+02 N	7.8E+00 N		
2,4-DINITROPHENOL	51285	2.00E-03 I					7.3E+01 N	7.3E+00 N	2.7E+00 N	2.0E+03 N	1.6E+02 N		
DINITROTOLUENE MIX			6.80E-01 I				9.8E-02 C	9.2E-03 C	4.6E-03 C	4.2E+00 C	9.4E-01 C		
2,4-DINITROTOLUENE	121142	2.00E-03 I					7.3E+01 N	7.3E+00 N	2.7E+00 N	2.0E+03 N	1.6E+02 N	2.9E-02	5.7E-01 N
2,6-DINITROTOLUENE	606202	1.00E-03 H					3.7E+01 N	3.7E+00 N	1.4E+00 N	1.0E+03 N	7.8E+01 N	1.2E-02	2.5E-01 N
DINOSEB	88857	1.00E-03 I					3.7E+01 N	3.7E+00 N	1.4E+00 N	1.0E+03 N	7.8E+01 N	8.7E-03	1.7E-01 N
DIOCTYLPHTHALATE	117840	4.00E-02 P					1.5E+03 N	1.5E+02 N	5.4E+01 N	4.1E+04 N	3.1E+03 N	2.4E+05	4.9E+06 N
1,4-DIOXANE	123911		1.10E-02 I				6.1E+00 C	5.7E-01 C	2.9E-01 C	2.6E+02 C	5.8E+01 C	1.3E-03	2.6E-02 C
DIPHENYLAMINE	122394	2.50E-02 I					9.1E+02 N	9.1E+01 N	3.4E+01 N	2.6E+04 N	2.0E+03 N	1.3E+00	2.5E+01 N
1,2-DIPHENYLHYDRAZINE	122667		8.00E-01 I		8.00E-01 I		8.4E-02 C	7.8E-03 C	3.9E-03 C	3.6E+00 C	8.0E-01 C	1.3E-04	2.5E-03 C
DIQUAT	85007	2.20E-03 I					8.0E+01 N	8.0E+00 N	3.0E+00 N	2.2E+03 N	1.7E+02 N	1.7E-02	3.3E-01 N
DISULFOTON	298044	4.00E-05 I					1.5E+00 N	1.5E-01 N	5.4E-02 N	4.1E+01 N	3.1E+00 N	3.2E-03	6.4E-02 N
1,4-DITHIANE	505293	1.00E-02 I					3.7E+02 N	3.7E+01 N	1.4E+01 N	1.0E+04 N	7.8E+02 N		
DIURON	330541	2.00E-03 I					7.3E+01 N	7.3E+00 N	2.7E+00 N	2.0E+03 N	1.6E+02 N	5.8E-02	1.2E+00 N
ENDOSULFAN	115297	6.00E-03 I					2.2E+02 N	2.2E+01 N	8.1E+00 N	6.1E+03 N	4.7E+02 N	9.8E-01	2.0E+01 N
ENDRIN	72208	3.00E-04 I					1.1E+01 N	1.1E+00 N	4.1E-01 N	3.1E+02 N	2.3E+01 N	2.7E-01	5.4E+00 N
EPICHLOROHYDRIN	106898	2.00E-03 H	9.90E-03 I	2.86E-04 I	4.20E-03 I	y	2.0E+00 N	1.0E+00 N	3.2E-01 C	2.9E+02 C	6.5E+01 C	4.2E-04	8.4E-03 N
ETHION	563122	5.00E-04 I					1.8E+01 N	1.8E+00 N	6.8E-01 N	5.1E+02 N	3.9E+01 N	3.2E-01	6.4E+00 N
2-ETHOXYETHANOL	110805	4.00E-01 H		5.70E-02 I			1.5E+04 N	2.1E+02 N	5.4E+02 N	4.1E+05 N	3.1E+04 N	3.3E+00	6.5E+01 N
ETHYL ACETATE	141786	9.00E-01 I				y	5.5E+03 N	3.3E+03 N	1.2E+03 N	9.2E+05 N	7.0E+04 N	1.7E+00	3.5E+01 N
ETHYLBENZENE	100414	1.00E-01 I		2.90E-01 I		y	1.3E+03 N	1.1E+03 N	1.4E+02 N	1.0E+05 N	7.8E+03 N	7.5E-01	1.5E+01 N
ETHYLENE DIAMINE	107153	9.00E-02 P					3.3E+03 N	3.3E+02 N	1.2E+02 N	9.2E+04 N	7.0E+03 N		
ETHYLENE GLYCOL	107211	2.00E+00 I					7.3E+04 N	7.3E+03 N	2.7E+03 N	2.0E+06 N	1.6E+05 N	1.5E+01	3.0E+02 N
ETHYLENE GLYCOL MONOBUTYL ETHER	111762	5.00E-01 I		3.70E+00 I			1.8E+04 N	1.4E+04 N	6.8E+02 N	5.1E+05 N	3.9E+04 N		
ETHYLENE OXIDE	75218		1.00E+00 H		3.50E-01 H	y	2.3E-02 C	1.8E-02 C	3.2E-03 C	2.9E+00 C	6.4E-01 C	4.6E-06	9.5E-05 C
ETHYLENE THIOUREA	96457	8.00E-05 I	1.1E-01 H				6.1E-01 C	5.7E-02 C	2.9E-02 C	2.6E+01 C	5.8E+00 C		
ETHYL ETHER	60297	2.00E-01 I				y	1.2E+03 N	7.3E+02 N	2.7E+02 N	2.0E+05 N	1.6E+04 N	4.2E-01	8.5E+00 N
ETHYL METHACRYLATE	97632	9.00E-02 H				y	5.5E+02 N	3.3E+02 N	1.2E+02 N	9.2E+04 N	7.0E+03 N	1.0E+00	2.1E+01 N
FENAMIPHOS	22224926	2.50E-04 I					9.1E+00 N	9.1E-01 N	3.4E-01 N	2.6E+02 N	2.0E+01 N	7.8E-03	1.6E-01 N

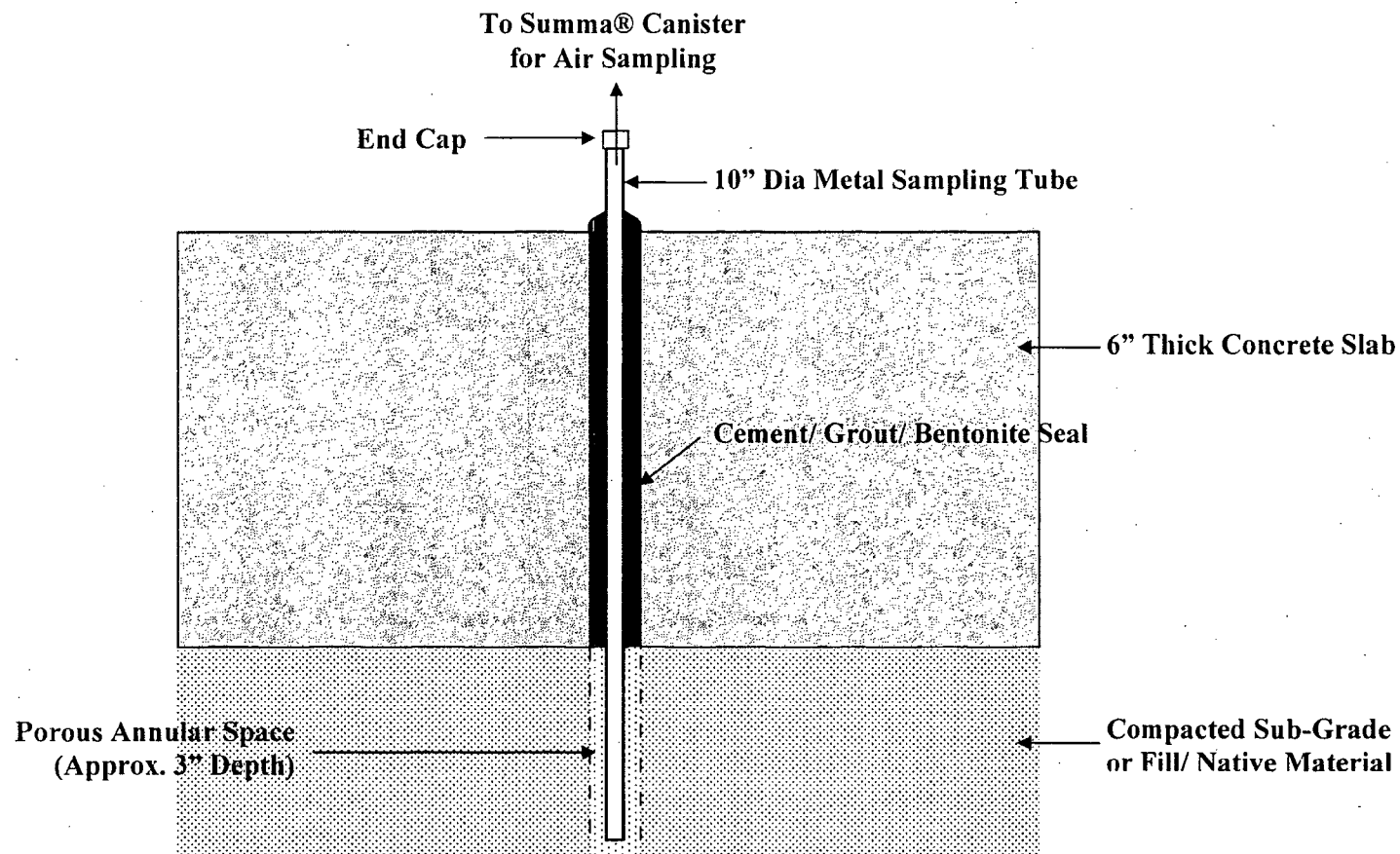
Sources: I = IRIS H = HEAST A = HEAST Alternate W = Withdrawn from IRIS or HEAST E = EPA-NCEA provisional value O = other P = EPA provisional peer-reviewed value							Basic C = Carcinogenic effects N = Noncarcinogenic effects * = RBC at H of 0.1 = RBC-c. see Alternate RBCs ** = See Alternate RBCs					Region III SSLs	
Chemical	CAS	RfDo mg/kg/d	CSFo 1/mg/kg/d	RfDi mg/kg/d	CSFi 1/mg/kg/d	VOC	Risk-based concentrations					Soil, for groundwater migration	
							Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg	DAF 1 mg/kg	DAF 20 mg/kg
FLUOMETURON	2164172	1.30E-02 I					4.7E+02 N	4.7E+01 N	1.8E+01 N	1.3E+04 N	1.0E+03 N		
FLUORINE	7782414	6.00E-02 I					2.2E+03 N	2.2E+02 N	8.1E+01 N	6.1E+04 N	4.7E+03 N		
FOMESAFEN	72178020		1.90E-01 I				3.5E-01 C	3.3E-02 C	1.7E-02 C	1.5E+01 C	3.4E+00 C		
FONOFOS	944229	2.00E-03 I					7.3E+01 N	7.3E+00 N	2.7E+00 N	2.0E+03 N	1.6E+02 N	1.8E-01	3.5E+00 N
FORMALDEHYDE	50000	2.00E-01 I			4.50E-02 I		7.3E+03 N	1.4E-01 C	2.7E+02 N	2.0E+05 N	1.6E+04 N	1.5E+00	3.0E+01 N
FORMIC ACID	64186	2.00E+00 H		8.6E-04 P			7.3E+04 N	3.1E+00 N	2.7E+03 N	2.0E+06 N	1.6E+05 N		
FURAN	110009	1.00E-03 I				y	6.1E+00 N	3.7E+00 N	1.4E+00 N	1.0E+03 N	7.8E+01 N	1.5E-03	3.0E-02 N
FURAZOLIDONE	67458		3.80E+00 H				1.8E-02 C	1.6E-03 C	8.3E-04 C	7.5E-01 C	1.7E-01 C		
FURFURAL	98011	3.00E-03 I			1.00E-02 A		1.1E+02 N	3.7E+01 N	4.1E+00 N	3.1E+03 N	2.3E+02 N	2.3E-02	4.6E-01 N
GLYCIDALDEHYDE	765344	4.00E-04 I			2.90E-04 H		1.5E+01 N	1.1E+00 N	5.4E-01 N	4.1E+02 N	3.1E+01 N		
GLYPHOSATE	1071836	1.00E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	1.0E+05 N	7.8E+03 N	2.6E+01	5.3E+02 N
HEPTACHLOR	76448	5.00E-04 I	4.50E+00 I		4.50E+00 I		1.5E-02 C	1.4E-03 C	7.0E-04 C	6.4E-01 C	1.4E-01 C	4.2E-02	8.4E-01 C
HEPTACHLOR EPOXIDE	1024573	1.30E-05 I	9.10E+00 I		9.10E+00 I		7.4E-03 C	6.9E-04 C	3.5E-04 C	3.1E-01 C	7.0E-02 C	1.2E-03	2.5E-02 C
HEXABROMOBENZENE	87821	2.00E-03 I					7.3E+01 N	7.3E+00 N	2.7E+00 N	2.0E+03 N	1.6E+02 N		
HEXACHLOROBENZENE	118741	8.00E-04 I	1.60E+00 I		1.60E+00 I		4.2E-02 C	3.9E-03 C	2.0E-03 C	1.8E+00 C	4.0E-01 C	2.6E-03	5.2E-02 C
HEXACHLOROBUTADIENE	87683	2.00E-04 H	7.80E-02 I		7.80E-02 I		8.6E-01 C	8.0E-02 C	4.0E-02 C	3.7E-01 C	8.2E+00 C	9.2E-02	1.8E+00 C
ALPHA-HCH	319846		6.30E+00 I		6.30E+00 I		1.1E-02 C	9.9E-04 C	5.0E-04 C	4.5E-01 C	1.0E-01 C	4.5E-05	8.9E-04 C
BETA-HCH	319857		1.80E+00 I		1.80E+00 I		3.7E-02 C	3.5E-03 C	1.8E-03 C	1.6E+00 C	3.5E-01 C	1.6E-04	3.1E-03 C
GAMMA-HCH (LINDANE)	58899	3.00E-04 I	1.30E+00 H				5.2E-02 C	4.8E-03 C	2.4E-03 C	2.2E+00 C	4.9E-01 C	2.2E-04	4.3E-03 C
TECHNICAL HCH	608731		1.80E+00 I		1.80E+00 I		3.7E-02 C	3.5E-03 C	1.8E-03 C	1.6E+00 C	3.5E-01 C		
HEXACHLOROCYCLOPENTADIENE	77474	6.00E-03 I		5.7E-05 I			2.2E+02 N	2.1E-01 N	8.1E+00 N	6.1E+03 N	4.7E+02 N	8.8E+01	1.8E+03 N
HEXACHLORODIBENZODIOXIN MIX	19408743		6.20E+03 I		4.55E+03 I		1.1E-05 C	1.4E-06 C	5.1E-07 C	4.6E-04 C	1.0E-04 C		
HEXACHLOROETHANE	67721	1.00E-03 I	1.40E-02 I		1.40E-02 I		4.8E+00 C	4.5E-01 C	2.3E-01 C	2.0E+02 C	4.6E-01 C	1.8E-02	3.6E-01 C
HEXACHLOROPHENE	70304	3.00E-04 I					1.1E+01 N	1.1E+00 N	4.1E-01 N	3.1E+02 N	2.3E+01 N	1.0E+02	2.0E+03 N
1,6-HEXAMETHYLENE DIISOCYANATE	622060			2.90E-06 I				1.1E-02 N					
HEXANE	110543	1.10E+01 P		5.71E-02 I		y	4.2E+02 N	2.1E+02 N	1.5E+04 N	1.1E+07 N	8.6E+05 N	8.2E-01	1.6E+01 N
HEXAZINONE	61235042	3.30E-02 I					1.2E+03 N	1.2E+02 N	4.5E+01 N	3.4E+04 N	2.6E+03 N		
HMX	2691410	5.00E-02 I					1.8E+03 N	1.8E+02 N	6.8E+01 N	5.1E+04 N	3.9E+03 N		
HYDRAZINE	302012		3.00E+00 I		1.70E+01 I		2.2E-02 C	3.7E-04 C	1.1E-03 C	9.5E-01 C	2.1E-01 C		
HYDROGEN CHLORIDE	7647010			5.70E-03 I				2.1E+01 N					
HYDROGEN SULFIDE	7783064	3.00E-03 I		5.7E-04 I			1.1E+02 N	2.1E+00 N	4.1E+00 N	3.1E+03 N	2.3E+02 N		
HYDROQUINONE	123319	4.00E-02 P	5.6E-02 P				1.2E+00 C	1.1E-01 C	5.6E-02 C	5.1E-01 C	1.1E+01 C		
IRON	7439896	3.00E-01 E					1.1E+04 N	1.1E+03 N	4.1E+02 N	3.1E+05 N	2.3E+04 N		
ISOBUTANOL	78831	3.00E-01 I				y	1.8E+03 N	1.1E+03 N	4.1E+02 N	3.1E+05 N	2.3E+04 N	5.9E-01	1.2E+01 N
ISOPHORONE	78591	2.00E-01 I	9.50E-04 I				7.0E-01 C	6.6E+00 C	3.3E+00 C	3.0E+03 C	6.7E+02 C	2.1E-02	4.1E-01 C
ISOPROPALIN	33820530	1.50E-02 I					5.5E-02 N	5.5E+01 N	2.0E+01 N	1.5E+04 N	1.2E+03 N		
ISOPROPYL METHYL PHOSPHONIC ACID	1832548	1.00E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	1.0E+05 N	7.8E+03 N		
TETRAETHYLLEAD	78002	1.00E-07 I					3.7E+03 N	3.7E+04 N	1.4E+04 N	1.0E+01 N	7.8E+03 N	4.6E-05	9.2E-04 N
KEPONE	143500	2.00E-04 P	8.00E+00 P				8.4E-03 C	7.8E-04 C	3.9E-04 C	3.6E-01 C	8.0E-02 C		
LITHIUM	7439932	2.00E-02 E					7.3E+02 N	7.3E+01 N	2.7E+01 N	2.0E+04 N	1.6E+03 N		
MALATHION	121755	2.00E-02 I					7.3E+02 N	7.3E+01 N	2.7E+01 N	2.0E+04 N	1.6E+03 N	4.0E-01	8.1E+00 N
MALEIC ANHYDRIDE	108316	1.00E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	1.0E+05 N	7.8E+03 N		
MANGANESE-NONFOOD	7439965	2.00E-02 I		1.43E-05 I			7.3E+02 N	5.2E-02 N	2.7E+01 N	2.0E+04 N	1.6E+03 N	4.8E+01	9.5E+02 N
MANGANESE-FOOD	7439965	1.40E-01 I		1.43E-05 I			5.1E+03 N	5.2E-02 N	1.9E+02 N	1.4E+05 N	1.1E+04 N	3.3E+02	6.7E+03 N
MEPHOSFOLAN	950107	9.00E-05 H					3.3E+00 N	3.3E-01 N	1.2E-01 N	9.2E+01 N	7.0E+00 N		
MEPIQUAT CHLORIDE	24307264	3.00E-02 I					1.1E+03 N	1.1E+02 N	4.1E+01 N	3.1E+04 N	2.3E+03 N		
MERCURIC CHLORIDE	7487947	3.00E-04 I					1.1E+01 N	1.1E+00 N	4.1E-01 N	3.1E+02 N	2.3E+01 N		
MERCURY (elemental)	7439975			8.60E-05 I				3.1E-01 N					
METHYLMERCURY	22967926	1.00E-04 I					3.7E+00 N	3.7E-01 N	1.4E-01 N	1.0E+02 N	7.8E+00 N		
METHACRYLONITRILE	126987	1.00E-04 I		2.00E-04 A		y	1.0E+00 N	7.3E-01 N	1.0E+00 N	1.0E+02 N	7.8E+00 N	2.1E-04	4.2E-03 N
METHANOL	67561	5.00E-01 I					1.8E+04 N	1.8E+03 N	6.8E+02 N	5.1E+05 N	3.9E+04 N	3.8E+00	7.5E+01 N
METHIOATHION	950378	1.00E-03 I					3.7E+01 N	3.7E+00 N	1.4E+00 N	1.0E+03 N	7.8E+01 N		
METHOXYCHLOR	72435	5.00E-03 I					1.8E+02 N	1.8E+01 N	6.8E+00 N	5.1E+03 N	3.9E+02 N	1.5E+01	3.1E+02 N
METHYL ACETATE	79209	1.00E+00 H				y	6.1E-03 N	3.7E-03 N	1.4E-03 N	1.0E+06 N	7.8E+04 N	1.2E+00	2.5E+01 N
METHYL ACRYLATE	96333	3.00E-02 A					1.8E+02 N	1.1E+02 N	4.1E-01 N	3.1E+04 N	2.3E+03 N	5.0E-01	1.0E+01 N
2-METHYLANILINE	95534		2.40E-01 H				2.8E-01 C	2.6E-02 C	1.3E-02 C	1.2E+01 C	2.7E+00 C	2.8E-04	5.7E-03 C
4-(2-METHYL-4-CHLOROPHENOXY) BUTYRIC ACID	94815	1.00E-02 I					3.7E+02 N	3.7E+01 N	1.4E+01 N	1.0E+04 N	7.8E+02 N		
2-METHYL-4-CHLOROPHENOXYACETIC ACID (MCPA)	94746	5.00E-04 I					1.8E+01 N	1.8E+00 N	6.8E-01 N	5.1E+02 N	3.9E+01 N		
2-(2-METHYL-4-CHLOROPHENOXY)PROPIONIC ACID (MCPA)	93652	1.00E-03 I					3.7E-01 N	3.7E+00 N	1.4E+00 N	1.0E+03 N	7.8E+01 N		
METHYLCYCLOHEXANE	108872			8.60E-01 H		y	6.3E+03 N	3.1E+03 N					
METHYLENE BROMIDE	74953	1.00E-02 A				y	6.1E+01 N	3.7E+01 N	1.4E+01 N	1.0E+04 N	7.8E+02 N	1.5E-02	3.0E-01 N
METHYLENE CHLORIDE	75092	6.00E-02 I	7.50E-03 I	8.60E-01 H	1.65E-03 I	y	4.1E+00 C	3.8E+00 C	4.2E-01 C	3.8E+02 C	8.5E+01 C	9.5E-04	1.9E-02 C
4,4'-METHYLENE BIS(2-CHLOROANILINE)	101144	7.00E-04 H	1.30E-01 H		1.30E-01 H		5.2E-01 C	4.8E-02 C	2.4E-02 C	2.2E+01 C	4.9E+00 C		
4,4'-METHYLENE BIS(N,N'-DIMETHYL)ANILINE	101611		4.60E-02 I				1.5E+00 C	1.4E-01 C	6.9E-02 C	6.2E+01 C	1.4E+01 C		
4,4'-METHYLENEDI(2-PHENYL ISOCYANATE)	101688			1.7E-04 I				8.2E-01 N					
METHYL ETHYL KETONE (2-BUTANONE)	78933	6.00E-01 I		1.40E+00 I		y	7.0E+03 N	5.1E+03 N	8.1E+02 N	6.1E+05 N	4.7E+04 N	1.5E+00	2.9E+01 N

Sources: I = IRIS H = HEAST A = HEAST Alternate W = Withdrawn from IRIS or HEAST E = EPA-NCEA provisional value O = other P = EPA provisional peer-reviewed value							Basic C = Carcinogenic effects N = Noncarcinogenic effects ! = RBC at HI of 0.1 < RBC < 1, see Alternate RBCs !! = See Alternate RBCs					Region III SSLs	
Chemical	CAS	RfDo mg/kg/d	CSFo 1/mg/kg/d	RfDi mg/kg/d	CSFi 1/mg/kg/d	VOC	Risk-based concentrations					Soil, for groundwater migration	
							Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg	DAF 1 mg/kg	DAF 20 mg/kg
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	108101			8.60E-01 I		y	6.3E+03 N	3.1E+03 N				2.9E+00	5.9E+01 N
METHYL METHACRYLATE	80626	1.40E+00 I		2.00E-01 I		y	1.4E+03 N	7.3E+02 N	1.9E+03 N	1.4E+06 N	1.1E+05 N	3.2E-01	6.5E+00 N
2-METHYL-5-NITROANILINE	99558		3.30E-02 H				2.0E+00 C	1.9E-01 C	9.6E-02 C	8.7E+01 C	1.9E+01 C		
METHYL PARATHION	298000	2.50E-04 I					9.1E+00 N	9.1E-01 N	3.4E-01 N	2.6E+02 N	2.0E+01 N	4.3E-03	8.5E-02 N
2-METHYLPHENOL	95487	5.00E-02 I					1.8E+03 N	1.8E+02 N	6.8E+01 N	5.1E+04 N	3.9E+03 N		
3-METHYLPHENOL	108394	5.00E-02 I					1.8E+03 N	1.8E+02 N	6.8E+01 N	5.1E+04 N	3.9E+03 N		
4-METHYLPHENOL	106445	5.00E-03 H					1.8E+02 N	1.8E+01 N	6.8E+00 N	5.1E+03 N	3.9E+02 N		
METHYLSTYRENE MIX	25013154	6.00E-03 A		1.00E-02 A		y	5.5E+01 N	3.7E+01 N	8.1E+00 N	6.1E+03 N	4.7E+02 N	5.1E-02	1.0E+00 N
ALPHA-METHYLSTYRENE	98839	7.00E-02 A				y	4.3E+02 N	2.6E+02 N	9.5E+01 N	7.2E+04 N	5.5E+03 N	4.0E-01	7.9E+00 N
METHYL TERT-BUTYL ETHER	1634044		4.00E-03 O	8.57E-01 I		y	2.6E+00 C	1.6E+00 C	7.9E-01 C	7.2E+02 C	1.6E+02 C	5.9E-04	1.2E-02 C
METOLACHLOR (DUAL)	51218452	1.50E-01 I					5.5E+03 N	5.5E+02 N	2.0E+02 N	1.5E+05 N	1.2E+04 N		
MIREX	2355855	2.00E-04 I					7.3E+00 N	7.3E-01 N	2.7E-01 N	2.0E+02 N	1.6E+01 N		
MOLYBDENUM	7439987	5E-03 I					1.8E+02 N	1.8E+01 N	6.8E+00 N	5.1E+03 N	3.9E+02 N		
MONOCHLORAMINE	10599903	1E-01 I		1.00E-01 H			3.7E+03 N	3.7E+02 N	1.4E+02 N	1.0E+05 N	7.8E+03 N		
NALED	300765	2E-03 I					7.3E+01 N	7.3E+00 N	2.7E+00 N	2.0E+03 N	1.6E+02 N		
NICKEL REFINERY DUST					8.4E-01 I			7.5E-03 C					
NICKEL	7440020	2.00E-02 I					7.3E+02 N	7.3E+01 N	2.7E+01 N	2.0E+04 N	1.6E+03 N		
NITRATE	14797558	1.60E+00 I					5.8E+04 N	5.8E+03 N	2.2E+03 N	1.6E+06 N	1.3E+05 N		
NITRITE	14797650	1.00E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	1.0E+05 N	7.8E+03 N		
2-NITROANILINE	88744	3.00E-03 P		3.00E-05 P			1.1E+02 N	1.1E-01 N	4.1E+00 N	3.1E+03 N	2.3E+02 N		
3-NITROANILINE	99092	3.00E-04 P	2.00E-02 P	3.00E-04 P			3.3E+00 C	3.1E-01 C	1.6E-01 C	1.4E+02 C	2.3E+01 N		
4-NITROANILINE	100016	3.00E-03 P	2.00E-02 P	1.00E-03 P			3.3E+00 C	3.1E-01 C	1.6E-01 C	1.4E+02 C	3.2E+01 C		
NITROBENZENE	98953	5.00E-04 I		6.00E-04 A		y	3.5E+00 N	2.2E+00 N	6.8E+01 N	5.1E+02 N	3.9E+01 N	1.2E-03	2.3E-02 N
NITROFURANTOIN	67209	7.00E-02 H					2.6E+03 N	2.6E+02 N	9.5E+01 N	7.2E+04 N	5.5E+03 N		
NITROFURAZONE	59870		1.50E+00 H				4.5E-02 C	4.2E-03 C	2.1E-03 C	1.9E+00 C	4.3E-01 C		
NITROGLYCERIN	55630		1.4E-02 E				4.8E+00 C	4.5E-01 C	2.3E-01 C	2.0E+02 C	4.6E+01 C		
2-NITROPROPANE	79469			5.70E-03 I	9.40E+00 H	y	1.3E-03 C	6.7E-04 C				3.2E-07	6.4E-06 C
N-NITROSO-DI-N-BUTYLAMINE	924163		5.40E+00 I		5.80E+00 I	y	1.9E-03 C	1.1E-03 C	5.8E-04 C	5.3E-01 C	1.2E-01 C	1.4E-06	2.7E-05 C
N-NITROSO-DIETHANOLAMINE	1116547		2.80E+00 I				2.4E-02 C	2.2E-03 C	1.1E-03 C	1.0E+00 C	2.3E-01 C		
N-NITROSO-DIETHYLAMINE	55185		1.50E+02 I		1.50E+02 I		4.5E-04 C	4.2E-05 C	2.1E-05 C	1.9E-02 C	4.3E-03 C	1.1E-07	2.3E-06 C
N-NITROSO-DIMETHYLAMINE	62759	8.00E-06 P	5.10E+01 I		5.10E+01 I		1.3E-03 C	1.2E-04 C	6.2E-05 C	5.6E-02 C	1.3E-02 C	2.8E-07	5.7E-06 C
N-NITROSO-DIPHENYLAMINE	86306	2.00E-02 P	4.90E-03 I				1.4E-01 C	1.3E+00 C	6.4E-01 C	5.8E+02 C	1.3E+02 C	3.8E-02	7.6E-01 C
N-NITROSO-DIPROPYLAMINE	621647		7.00E+00 I				9.6E-03 C	8.9E-04 C	4.5E-04 C	4.1E-01 C	9.1E-02 C	2.4E-06	4.7E-05 C
N-NITROSO-N-ETHYLEUREA	759739		1.40E+02 H				4.8E-04 C	4.5E-05 C	2.3E-05 C	2.0E-02 C	4.6E-03 C		
N-NITROSO-N-METHYLETHYLAMINE	10595956		2.20E+01 I				3.0E-03 C	2.8E-04 C	1.4E-04 C	1.3E-01 C	2.9E-02 C		
N-NITROSO-PYRROLIDINE	930552		2.10E+00 I		2.10E+00 I		3.2E-02 C	3.0E-03 C	1.5E-03 C	1.4E+00 C	3.0E-01 C		
M-NITROTOLUENE	99081	2.00E-02 P				y	1.2E+02 N	7.3E+01 N	2.7E+01 N	2.0E+04 N	1.6E+03 N		
O-NITROTOLUENE	88722	1.00E-02 H	2.30E-01 P			y	4.6E-02 C	2.7E-02 C	1.4E-02 C	1.2E+01 C	2.8E+00 C		
P-NITROTOLUENE	99990	1.00E-02 P	1.7E-02 P			y	6.2E-01 C	3.7E-01 C	1.9E-01 C	1.7E+02 C	3.8E-01 C		
NUSTAR	85509199	7.00E-04 I					2.6E+01 N	2.6E+00 N	9.5E-01 N	7.2E+02 N	5.5E+01 N		
ORYZALIN	19044883	5.00E-02 I					1.8E+03 N	1.8E+02 N	6.8E+01 N	5.1E+04 N	3.9E+03 N		
OXADIAZON	19666309	5.00E-03 I					1.8E+02 N	1.8E+01 N	6.8E+00 N	5.1E+03 N	3.9E+02 N		
OXAMYL	23135220	2.50E-02 I					9.1E+02 N	9.1E+01 N	3.4E+01 N	2.6E+04 N	2.0E+03 N	1.9E-01	3.8E+00 N
OXYFLUORFEN	42874033	3.00E-03 I					1.1E+02 N	1.1E+01 N	4.1E+00 N	3.1E+03 N	2.3E+02 N		
PARAQUAT DICHLORIDE	1910425	4.50E-03 I					1.6E+02 N	1.6E+01 N	6.1E+00 N	4.6E+03 N	3.5E+02 N		
PARATHION	56382	6.00E-03 H					2.2E+02 N	2.2E+01 N	8.1E+00 N	6.1E+03 N	4.7E+02 N	5.0E-01	1.0E+01 N
PENTACHLOROBENZENE	608935	8.00E-04 I					2.9E+01 N	2.9E+00 N	1.1E+00 N	8.2E+02 N	6.3E+01 N	1.0E+00	2.0E+01 N
PENTACHLORONITROBENZENE	82688	3.00E-03 I	2.60E-01 H				2.6E-01 C	2.4E-02 C	1.2E-02 C	1.1E+01 C	2.5E+00 C	4.1E-03	8.2E-02 C
PENTACHLOROPHENOL	87865	3.00E-02 I	1.20E-01 I				5.6E-01 C	5.2E-02 C	2.6E-02 C	2.4E+01 C	5.3E+00 C		
PERMETHRIN	52645531	5.00E-02 I					1.8E+03 N	1.8E+02 N	6.8E+01 N	5.1E+04 N	3.9E+03 N	1.2E+02	2.4E+03 N
PHENOL	108952	3.00E-01 I					1.1E+04 N	1.1E+03 N	4.1E+02 N	3.1E+05 N	2.3E+04 N	3.3E+00	6.7E+01 N
M-PHENYLENEDIAMINE	108452	6.00E-03 I					2.2E+02 N	2.2E+01 N	8.1E+00 N	6.1E+03 N	4.7E+02 N	4.9E-02	9.8E-01 N
O-PHENYLENEDIAMINE	95545		4.70E-02 H				1.4E+00 C	1.3E-01 C	6.7E-02 C	6.1E+01 C	1.4E-01 C		
P-PHENYLENEDIAMINE	106503	1.80E-01 H					6.9E+03 N	6.9E+02 N	2.6E+02 N	1.9E+05 N	1.5E+04 N		
2-PHENYLPHENOL	90437		1.90E-03 H				3.5E+01 C	3.3E+00 C	1.7E+00 C	1.5E+03 C	3.4E+02 C		
PHOSPHINE	7803512	3.00E-04 I		8.60E-05 I			1.1E+01 N	3.1E-01 N	4.1E-01 N	3.1E+02 N	2.3E+01 N		
PHOSPHORIC ACID	7664382			2.90E-03 I				1.1E+01 N					
PHOSPHORUS (WHITE)	7723140	2.00E-05 I					7.3E-01 N	7.3E-02 N	2.7E-02 N	2.0E+01 N	1.6E+00 N		
P-PHTHALIC ACID	100210	1.00E+00 H					3.7E+04 N	3.7E+03 N	1.4E+03 N	1.0E+06 N	7.8E+04 N		
PHTHALIC ANHYDRIDE	85449	2.00E+00 I		3.43E-02 H			7.3E+04 N	1.3E+02 N	2.7E+03 N	2.0E+06 N	1.6E+05 N	2.6E+01	5.2E+02 N
POLYBROMINATED BIPHENYLS		7.00E-06 H	8.90E+00 H				7.5E-03 C	7.0E-04 C	3.5E-04 C	3.2E-01 C	7.2E-02 C		
POLYCHLORINATED BIPHENYLS	1336363		2.00E+00 I		2.00E+00 I		3.3E-02 C	3.1E-03 C	1.6E-03 C	1.4E+00 C	3.2E-01 C	2.1E-02	4.1E-01 C
AROCLOR-1016	12674112	7.00E-05 I	7.00E-02 I		7.00E-02 I		9.6E-01 C	8.9E-02 C	4.5E-02 C	4.1E+01 C	5.5E+00 N	2.1E-01	4.2E+00 C
AROCLOR-1221	11104282		2.00E+00 I		2.00E+00 I		3.3E-02 C	3.1E-03 C	1.6E-03 C	1.4E+00 C	3.2E-01 C		
AROCLOR-1232	11141165		2.00E+00 I		2.00E+00 I		3.3E-02 C	3.1E-03 C	1.6E-03 C	1.4E+00 C	3.2E-01 C		
AROCLOR-1242	53469219		2.00E+00 I		2.00E+00 I		3.3E-02 C	3.1E-03 C	1.6E-03 C	1.4E+00 C	3.2E-01 C		

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Chemical	CAS	RfDo mg/kg/d	CSFo 1/mg/kg/d	RfDi mg/kg/d	CSFi 1/mg/kg/d	VOC	Risk-based concentrations					Soil, for groundwater migration	
							Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg	DAF 1 mg/kg	DAF 20 mg/kg
AROCOR-1248	12672296		2.00E+00 I		2.00E+00 I		3.3E-02 C	3.1E-03 C	1.6E-03 C	1.4E+00 C	3.2E-01 C		
AROCOR-1254	11097691	2.00E-05 I		2.00E+00 I	2.00E+00 I		3.3E-02 C	3.1E-03 C	1.6E-03 C	1.4E+00 C	3.2E-01 C	5.4E-02	1.1E+00 C
AROCOR-1260	11096825		2.00E+00 I		2.00E+00 I		3.3E-02 C	3.1E-03 C	1.6E-03 C	1.4E+00 C	3.2E-01 C		
POLYCHLORINATED TERPHENYLS	61788338		4.50E+00 E				1.5E-02 C	1.4E-03 C	7.0E-04 C	6.4E-01 C	1.4E-01 C		
POLYNUCLEAR AROMATIC HYDROCARBONS:													
ACENAPHTHENE	83329	6.00E-02 I				y	3.7E+02 N	2.2E+02 N	8.1E+01 N	6.1E+04 N	4.7E+03 N	5.2E+00	1.0E+02 N
ANTHRACENE	120127	3.00E-01 I				y	1.8E+03 N	1.1E+03 N	4.1E+02 N	3.1E+05 N	2.3E+04 N	2.3E+01	4.7E+02 N
BENZ[A]ANTHRACENE	56553		7.30E-01 E				9.2E-02 C	8.6E-03 C	4.3E-03 C	3.9E+00 C	8.7E-01 C	7.3E-02	1.5E+00 C
BENZO[B]FLUORANTHENE	205992		7.30E-01 E				9.2E-02 C	8.6E-03 C	4.3E-03 C	3.9E+00 C	8.7E-01 C	2.3E-01	4.5E+00 C
BENZO[K]FLUORANTHENE	207089		7.30E-02 E				9.2E-01 C	8.6E-02 C	4.3E-02 C	3.9E+01 C	8.7E-00 C	2.3E+00	4.5E+01 C
BENZO[A]PYRENE	50328		7.30E+00 I		3.10E+00 E		9.2E-03 C	2.0E-03 C	4.3E-04 C	3.9E-01 C	8.7E-02 C	1.9E-02	3.7E-01 C
CARBAZOLE	86748		2.00E-02 H				3.3E+00 C	3.1E-01 C	1.6E-01 C	1.4E+02 C	3.2E+01 C	2.3E-02	4.7E-01 C
CHRYSENE	218019		7.30E-03 E				9.2E+00 C	8.6E-01 C	4.3E-01 C	3.9E+02 C	8.7E+01 C	7.3E+00	1.5E+02 C
DIBENZ[A,H]ANTHRACENE	53703		7.30E+00 E				9.2E-03 C	8.6E-04 C	4.3E-04 C	3.9E-01 C	8.7E-02 C	7.0E-02	1.4E+00 C
DIBENZOFURAN	132649	2.00E-03 E				y	1.2E+01 N	7.3E+00 N	2.7E+00 N	2.0E+03 N	1.6E+02 N	1.9E-01	3.8E+00 N
FLUORANTHENE	206440	4.00E-02 I					1.5E+03 N	1.5E+02 N	5.4E+01 N	4.1E+04 N	3.1E+03 N	3.1E-02	6.3E+03 N
FLUORENE	86737	4.00E-02 I				y	2.4E+02 N	1.5E+02 N	5.4E+01 N	4.1E+04 N	3.1E+03 N	6.8E+00	1.4E+02 N
INDENO[1,2,3-C,D]PYRENE	193395		7.30E-01 E				9.2E-02 C	8.6E-03 C	4.3E-03 C	3.9E+00 C	8.7E-01 C	6.4E-01	1.3E+01 C
2-METHYLNAPHTHALENE	91576	4.00E-03 I				y	2.4E+01 N	1.5E+01 N	5.4E+00 N	4.1E+03 N	3.1E+02 N	2.2E-01	4.4E+00 N
NAPHTHALENE	91203	2.00E-02 I		9.00E-04 I		y	6.5E+00 N	3.3E+00 N	2.7E+01 N	2.0E+04 N	1.6E+03 N	7.7E-03	1.5E-01 N
PYRENE	129000	3.00E-02 I				y	1.8E+02 N	1.1E+02 N	4.1E+01 N	3.1E+04 N	2.3E+03 N	3.4E+01	6.8E+02 N
PROMETON	1610180	1.50E-02 I					5.5E+02 N	5.5E+01 N	2.0E+01 N	1.5E+04 N	1.2E+03 N		
PROMETRYN	7267196	4.00E-03 I					1.5E+02 N	1.5E+01 N	5.4E+00 N	4.1E+03 N	3.1E+02 N		
PROPACHLOR	1918167	1.30E-02 I					4.7E+02 N	4.7E+01 N	1.8E+01 N	1.3E+04 N	1.0E+03 N		
PROPANIL	709988	5.00E-03 I					1.8E+02 N	1.8E+01 N	6.8E+00 N	5.1E+03 N	3.9E+02 N		
PROPARGITE	2312358	2.00E-02 I					7.3E+02 N	7.3E+01 N	2.7E+01 N	2.0E+04 N	1.6E+03 N		
PROPYLENE GLYCOL	57556	5.00E-01 P		8.6E-04 P			1.8E+04 N	3.1E+00 N	6.8E+02 N	5.1E+05 N	3.9E+04 N		
PROPYLENE GLYCOL, MONOETHYL ETHER	5212538	7.00E-01 H					2.6E+04 N	2.6E+03 N	9.5E+02 N	7.2E+05 N	5.5E+04 N		
PROPYLENE GLYCOL, MONOMETHYL ETHER	107982	7.00E-01 H		5.70E-01 I			2.6E+04 N	2.1E+03 N	9.5E+02 N	7.2E+05 N	5.5E+04 N		
PURSUIT	81335775	2.50E-01 I					9.1E+03 N	9.1E+02 N	3.4E+02 N	2.6E+05 N	2.0E+04 N		
PYRIDINE	110861	1.00E-03 I					3.7E+01 N	3.7E+00 N	1.4E+00 N	1.0E+03 N	7.8E+01 N		
QUINOLINE	91225		3.00E+00 I				2.2E-02 C	2.1E-03 C	1.1E-03 C	9.5E-01 C	2.1E-01 C		
RDX	121824	3.00E-03 I	1.10E-01 I				6.1E-01 C	5.7E-02 C	2.9E-02 C	2.6E-01 C	5.8E+00 C		
RESMETHRIN	10453668	3.00E-02 I					1.1E+03 N	1.1E+02 N	4.1E+01 N	3.1E+04 N	2.3E+03 N		
RONNEL	299843	5.00E-02 H					1.8E+03 N	1.8E+02 N	6.8E+01 N	5.1E+04 N	3.9E+03 N		
ROTENONE	83794	4.00E-03 I					1.5E+02 N	1.5E+01 N	5.4E+00 N	4.1E+03 N	3.1E+02 N		
SELENIUM ACID	7783008	5.00E-03 I					1.8E+02 N	1.8E+01 N	6.8E+00 N	5.1E+03 N	3.9E+02 N		
SELENIUM	7782492	5.00E-03 I					1.8E+02 N	1.8E+01 N	6.8E+00 N	5.1E+03 N	3.9E+02 N	9.5E-01	1.9E-01 N
SILVER	7440224	5.00E-03 I					1.8E+02 N	1.8E+01 N	6.8E+00 N	5.1E+03 N	3.9E+02 N	1.6E+00	3.1E-01 N
SIMAZINE	122349	5.00E-03 I	1.20E-01 H				5.6E-01 C	5.2E-02 C	2.6E-02 C	2.4E+01 C	5.3E+00 C	1.7E-04	3.3E-03 C
SODIUM AZIDE	26628228	4.00E-03 I					1.5E+02 N	1.5E+01 N	5.4E+00 N	4.1E+03 N	3.1E+02 N		
SODIUM DIETHYLDITHIOCARBAMATE	148185	3.00E-02 I	2.70E-01 H				2.5E-01 C	2.3E-02 C	1.2E-02 C	1.1E+01 C	2.4E+00 C		
STRONTIUM, STABLE	7440246	6.00E-01 I					2.2E+04 N	2.2E+03 N	8.1E+02 N	6.1E+05 N	4.7E+04 N	7.7E-02	1.5E+04 N
STRYCHNINE	57249	3.00E-04 I					1.1E+01 N	1.1E+00 N	4.1E-01 N	3.1E+02 N	2.3E+01 N	8.3E-03	1.7E-01 N
STYRENE	100425	2.00E-01 I		2.86E-01 I		y	1.6E+03 N	1.0E+03 N	2.7E+02 N	2.0E+05 N	1.6E+04 N	2.9E+00	5.7E+01 N
2,3,7,8-TETRACHLORODIBENZODIOXIN	1746016		1.50E+05 H		1.50E+05 H		4.5E-07 C	4.2E-08 C	2.1E-08 C	1.9E-05 C	4.3E-06 C	4.3E-07	8.6E-06 C
1,2,4,5-TETRACHLOROBENZENE	95943	3.00E-04 I					1.1E+01 N	1.1E+00 N	4.1E-01 N	3.1E+02 N	2.3E+01 N	3.3E-02	6.6E-01 N
1,1,1,2-TETRACHLOROETHANE	630206	3.00E-02 I	2.60E-02 I		2.60E-02 I	y	4.1E-01 C	2.4E-01 C	1.2E-01 C	1.1E+02 C	2.5E+01 C	2.0E-04	4.0E-03 C
1,1,2,2-TETRACHLOROETHANE	79345	6.00E-02 P	2.00E-01 I		2.00E-01 I	y	5.3E-02 C	3.1E-02 C	1.6E-02 C	1.4E+01 C	3.2E+00 C	3.4E-05	6.8E-04 C
TETRACHLOROETHENE	127184	1.00E-02 I	5.4E-01 O	1.4E-01 E	2.00E-02 O	y	1.0E-01 C	3.1E-01 C	5.8E-03 C	5.3E+00 C	1.2E+00 C	2.3E-04	4.7E-03 C
2,3,4,6-TETRACHLOROPHENOL	58902	3.00E-02 I					1.1E+03 N	1.1E+02 N	4.1E+01 N	3.1E+04 N	2.3E+03 N		
P.A.A.A-TETRACHLOROTOLUENE	5216251		2.00E+01 H				3.3E-03 C	3.1E-04 C	1.6E-04 C	1.4E-01 C	3.2E-02 C		
1,1,1,2-TETRAFLUOROETHANE	811972			2.29E+01 I		y	1.7E+05 N	8.4E+04 N					
TETRAHYDROFURAN	109999	2.00E-01 E	7.6E-03 E	8.6E-02 E	6.8E-03 E		8.8E+00 C	9.2E-01 C	4.2E-01 C	3.8E+02 C	6.4E-01 C		
TETRYL	479458	1.00E-02 H					3.7E+02 N	3.7E+01 N	1.4E+01 N	1.0E+04 N	7.8E+02 N		
THALLIUM	7440280	7.00E-05 O					2.6E+00 N	2.6E-01 N	9.5E-02 N	7.2E+01 N	5.5E+00 N	1.8E-01	3.6E+00 N
THALLIUM ACETATE	563688	9.00E-05 I					3.3E+00 N	3.3E-01 N	1.2E-01 N	9.2E+01 N	7.0E+00 N		
THALLIUM CARBONATE	6533739	8.00E-05 I					2.9E+00 N	2.9E-01 N	1.1E-01 N	8.2E+01 N	6.3E+00 N		
THALLIUM CHLORIDE	7791120	8.00E-05 I					2.9E+00 N	2.9E-01 N	1.1E-01 N	8.2E+01 N	6.3E+00 N		
THALLIUM NITRATE	10102451	9.00E-05 I					3.3E+00 N	3.3E-01 N	1.2E-01 N	9.2E+01 N	7.0E+00 N		
THALLIUM SULFATE (2:1)	7446186	8.00E-05 I					2.9E+00 N	2.9E-01 N	1.1E-01 N	8.2E+01 N	6.3E+00 N		
THIOBENCARB	28249776	1.00E-02 I					3.7E+02 N	3.7E+01 N	1.4E+01 N	1.0E+04 N	7.8E+02 N		
TIN	7440315	5.00E-01 H					2.2E+04 N	2.2E+03 N	8.1E+02 N	6.1E+05 N	4.7E+04 N		
TITANIUM	7440326	4.00E+00 E		8.60E-03 E			1.5E+05 N	3.1E+01 N	5.4E+03 N	4.1E+06 N	3.1E+05 N		
TITANIUM DIOXIDE	13463677	4.00E+00 E		8.60E-03 E			1.5E+05 N	3.1E+01 N	5.4E+03 N	4.1E+06 N	3.1E+05 N		
TOLUENE	108883	2.00E-01 I		1.14E-01 I		y	7.5E+02 N	4.2E+02 N	2.7E+02 N	2.0E+05 N	1.6E+04 N	4.4E-01	8.8E+00 N

Sources: I = IRIS H = HEAST A = HEAST Alternate W = Withdrawn from IRIS or HEAST E = EPA-NCEA provisional value O = other P = EPA provisional peer-reviewed value							Risk-based concentrations					Region III SSLs	
Chemical	CAS	RfDo mg/kg/d	CSF _o 1/mg/kg/d	RfDi mg/kg/d	CSFi 1/mg/kg/d	VOC	Tap water ug/l	Ambient air ug/m ³	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg	Soil, for groundwater migration	
												DAF 1 mg/kg	DAF 20 mg/kg
TOLUENE-2,4-DIAMINE	95807		3.20E+00 H				2.1E-02 C	2.0E-03 C	9.9E-04 C	8.9E-01 C	2.0E-01 C		
TOLUENE-2,5-DIAMINE	95705	6.00E-01 H					2.2E-04 N	2.2E+03 N	8.1E+02 N	6.1E+05 N	4.7E+04 N		
TOLUENE-2,6-DIAMINE	823405	2.00E-01 H					7.3E-03 N	7.3E+02 N	2.7E+02 N	2.0E+05 N	1.6E+04 N		
P-TOLUIDINE	106490		1.90E-01 H				3.5E-01 C	3.3E-02 C	1.7E-02 C	1.5E-01 C	3.4E+00 C	3.0E-04	5.9E-03 C
TOXAPHENE	8001352		1.10E+00 I		1.10E+00 I		6.1E-02 C	5.7E-03 C	2.9E-03 C	2.6E+00 C	5.8E-01 C	3.1E-02	6.3E-01 C
1,2,4-TRIBROMOBENZENE	615543	5.00E-03 I					1.8E-02 N	1.8E+01 N	6.8E+00 N	5.1E-03 N	3.9E+02 N		
TRIBUTYL TIN OXIDE	56359	3.00E-04 I					1.1E-01 N	1.1E+00 N	4.1E-01 N	3.1E-02 N	2.3E+01 N		
2,4,6-TRICHLOROANILINE	634935		3.40E-02 H				2.0E+00 C	1.8E-01 C	9.3E-02 C	8.4E+01 C	1.9E+01 C		
1,2,4-TRICHLORO BENZENE	120821	1.00E-02 I		1.00E-03 P		y	7.2E+00 N	3.7E+00 N	1.4E+01 N	1.0E+04 N	7.8E+02 N	1.4E-02	2.8E-01 N
1,1,1-TRICHLOROETHANE	71556	2.80E-01 E		6.30E-01 P		y	3.2E-03 N	2.3E+03 N	3.8E+02 N	2.9E+05 N	2.2E+04 N	3.0E+00	6.0E+01 N
1,1,2-TRICHLOROETHANE	79005	4.00E-03 I	5.70E-02 I		5.60E-02 I	y	1.9E-01 C	1.1E-01 C	5.5E-02 C	5.0E-01 C	1.1E+01 C	3.9E-05	7.8E-04 C
TRICHLOROETHENE	79016	3.00E-04 E	4.00E-01 E	1.00E-02 E	4.00E-01 E	y	2.6E-02 C	1.6E-02 C	7.9E-03 C	7.2E-00 C	1.6E+00 C	1.3E-05	2.6E-04 C
TRICHLOROFLUOROMETHANE	75694	3.00E-01 I		2.00E-01 A		y	1.3E-03 N	7.3E+02 N	4.1E+02 N	3.1E-05 N	2.3E+04 N	1.1E+00	2.3E+01 N
2,4,5-TRICHLOROPHENOL	95954	1.00E-01 I					3.7E-03 N	3.7E+02 N	1.4E+02 N	1.0E+05 N	7.8E+03 N		
2,4,6-TRICHLOROPHENOL	88062		1.10E-02 I		1.00E-02 I		6.1E+00 C	6.3E-01 C	2.9E-01 C	2.6E+02 C	5.8E+01 C		
2,4,5-T	93765	1.00E-02 I					3.7E-02 N	3.7E+01 N	1.4E+01 N	1.0E+04 N	7.8E+02 N	9.8E-02	2.0E+00 N
2-(2,4,5-TRICHLOROPHENOXY)PROPIONIC ACID	93721	8.00E-03 I					2.9E-02 N	2.9E+01 N	1.1E+01 N	8.2E+03 N	6.3E+02 N	1.1E+00	2.1E+01 N
1,1,2-TRICHLOROPROPANE	598775	5.00E-03 I				y	3.0E-01 N	1.8E+01 N	6.8E+00 N	5.1E-03 N	3.9E+02 N	1.2E-02	2.5E-01 N
1,2,3-TRICHLOROPROPANE	96184	6.00E-03 I	2.00E+00 E	1.4E-03 E		y	5.3E-03 C	3.1E-03 C	1.6E-03 C	1.4E+00 C	3.2E-01 C	1.8E-06	3.6E-05 C
1,2,3-TRICHLOROPROPENE	96195	1.00E-02 P		3.00E-04 P		y	2.2E+00 N	1.1E+00 N	1.4E+01 N	1.0E+04 N	7.8E+02 N	8.8E-04	1.8E-02 N
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76131	3.00E+01 I		8.60E+00 H		y	5.9E-04 N	3.1E+04 N	4.1E+04 N	3.1E+07 N	2.3E+06 N	1.2E+02	2.3E+03 N
1,2,4-TRIMETHYLBENZENE	95636	5.00E-02 P		1.70E-03 P		y	1.2E-01 N	6.2E+00 N	6.8E+01 N	5.1E-04 N	3.9E+03 N		
1,3,5-TRIMETHYLBENZENE	108678	5.00E-02 P		1.70E-03 P		y	1.2E-01 N	6.2E+00 N	6.8E+01 N	5.1E-04 N	3.9E+03 N		
TRIMETHYL PHOSPHATE	512561		3.70E-02 H				1.8E-00 C	1.7E-01 C	8.5E-02 C	7.7E-01 C	1.7E+01 C		
1,3,5-TRINITROBENZENE	99354	3.00E-02 I					1.1E+03 N	1.1E+02 N	4.1E+01 N	3.1E+04 N	2.3E+03 N		
2,4,6-TRINITROTOLUENE	118967	5.00E-04 I	3.00E-02 I				2.2E+00 C	2.1E-01 C	1.1E-01 C	9.5E+01 C	2.1E+01 C		
URANIUM (SOLUBLE SALTS, from IRIS)	7440611	3.00E-03 I					1.1E-02 N	1.1E+01 N	4.1E+00 N	3.1E+03 N	2.3E+02 N		
URANIUM (SOLUBLE SALTS, provisional)	7440611	2.00E-04 E					7.3E+00 N	7.3E-01 N	2.7E-01 N	2.0E+02 N	1.6E+01 N		
VANADIUM	7440622	1.00E-03 E					3.7E-01 N	3.7E+00 N	1.4E+00 N	1.0E-03 N	7.8E+01 N	3.7E+01	7.3E+02 N
VANADIUM PENTOXIDE	1314621	9.00E-03 I					3.3E-02 N	3.3E+01 N	1.2E+01 N	9.2E+03 N	7.0E+02 N		
VANADIUM SULFATE	16785812	2.00E-02 H					7.3E-02 N	7.3E+01 N	2.7E+01 N	2.0E+04 N	1.6E+03 N		
VINCLOZOLIN	50471448	2.50E-02 I					9.1E-02 N	9.1E+01 N	3.4E+01 N	2.6E+04 N	2.0E+03 N		
VINYL ACETATE	108054	1.00E+00 H		5.71E-02 I		y	4.1E-02 N	2.1E+02 N	1.4E+03 N	1.0E+06 N	7.8E+04 N	8.7E-02	1.7E+00 N
VINYL CHLORIDE inc early life (see cover memos)	75014	3.00E-03 I	1.40E+00 I	2.8E-02 I	3.00E-02 I	y	1.5E-02 C	7.2E-02 C			9.0E-02 C	6.2E-06	1.2E-04 C
VINYL CHLORIDE, adult (see cover memos)	75014	3.00E-03 I	7.20E-01 I	2.8E-02 I	1.5E-02 I	y			4.4E-03 C	4.0E+00 C			
WARFARIN	81812	3.00E-04 I					1.1E+01 N	1.1E+00 N	4.1E-01 N	3.1E+02 N	2.3E+01 N	2.2E-02	4.4E-01 N
XYLENES	1330207	2.00E-01 I		3.00E-02 I		y	2.1E-02 N	1.1E+02 N	2.7E+02 N	2.0E+05 N	1.6E+04 N	1.5E-01	3.0E+00 N
ZINC	7440666	3.00E-01 I					1.1E+04 N	1.1E+03 N	4.1E+02 N	3.1E+05 N	2.3E+04 N	6.8E+02	1.4E+04 N
ZINC PHOSPHIDE	1314847	3E-04 I					1.1E-01 N	1.1E+00 N	4.1E-01 N	3.1E+02 N	2.3E+01 N		
ZINEB	12122677	5E-02 I					1.8E+03 N	1.8E+02 N	6.8E+01 N	5.1E+04 N	3.9E+03 N		

Sources: I = IRIS, H = HEAST, A = HEAST Alternate, W = Withdrawn from IRIS or HEAST E = EPA-NCEA provisional value, O = other, P = EPA provisional peer-reviewed value							Basic: C = Carcinogenic effects, N = Noncarcinogenic effects, * = RBC at HI of 0.1 = RBC-0; see Alternate RBCs, ** = See Alternate RBCs					Region III SSLs	
							Risk-based concentrations					Soil, for groundwater migration	
Chemical	CAS	RfDo mg/kg/d	CSF ₀ 1/mg/kg/d	RfDi mg/kg/d	CSF ₁ 1/mg/kg/d	VOC	Tap water ug/l	Ambient air ug/m ³	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg	DAF 1 mg/kg	DAF 20 mg/kg



**Environmental Waste
Management
Associates, LLC**
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Parsippany, NJ 07054
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SCALE:
N/A

DATE:
1/19/05

DRAWN BY: AK

CHECKED BY: SM

PROJECT#

203711

SUB-SLAB AIR SAMPLING POINT DETAILS

Three Y, LLC
115 River Road, Edgewater, NJ

FIGURE #

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